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1996 Annual Report

East Hennepin Avenue Site

*Prepared for
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Barr
Engineering Company

1996 Annual Report East Hennepin Avenue Site

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1.0 Introduction

This report summarizes the results from annual monitoring and remedial action operations conducted at the East Hennepin Avenue site during 1996. The 1996 monitoring was carried out in response to the requirements of Part II of Exhibit A to the October 23, 1984, Response Order by Consent between General Mills and the Minnesota Pollution Control Agency (MPCA); the January 1985 groundwater pumpout system plan–East Hennepin Avenue site; the Minnesota Department of Natural Resources (MDNR) water appropriation permits (85-6144 and 85-6145); the Magnolia Member aquifer pump test report–remedial action design plan; the NPDES Permit MN 0056022; and the 1994-1999 Operations and Monitoring Plan.

The 1996 groundwater monitoring data (water levels and water quality) are provided in Section 2.0 of this report. The validity of the 1996 data is evaluated in Appendix A and the results of this evaluation are summarized in Section 3.0. Remedial action operations including the groundwater pumpout and treatment systems and associated maintenance are discussed in Section 4.0. Results of the 1996 monitoring are discussed in Section 5.0 along with an evaluation of historical trends in groundwater levels and groundwater quality at the site. Historical data are presented in Appendix B. The effectiveness of the groundwater pumpout system is discussed in Section 6.0. Recommendations for activities at the site for 1997 are presented in Section 7.0. The 1994-1999 Operation and Monitoring Plan is provided in Appendix C.

The East Hennepin Avenue site is located in Minneapolis, Minnesota, as shown on the regional location map on Figure 1. A map of the site is shown on Figure 2. The generalized geologic column for the site is shown on Figure 3.

2.0 Groundwater Monitoring

2.1 Water Level Monitoring

The 1996 monitoring program involved measurement of water levels from five wells screened in the glacial drift; nine wells screened in the Carimona Member of the Platteville Formation; four wells open to the Magnolia Member of the Platteville Formation; and one monitoring well screened in the St. Peter Sandstone. All water level monitoring activities were carried out in accordance with the 1994-1999 Operations and Monitoring Plan.

The results from 1996 water level monitoring are presented in Sections 2.1.1 through 2.1.4. Groundwater elevations are presented in Tables 1 through 4. Historical water elevation data for the glacial drift wells, Carimona Member wells, Magnolia Member wells, St. Peter wells and pumpout wells are provided in Appendix B of this report.

2.1.1 Glacial Drift

Groundwater elevations were measured in the glacial drift monitoring wells (Q, T, V, W and X) on August 13, 1996. The locations of these wells are shown on Figure 4. A summary of 1996 water level monitoring results is presented in Table 1. The estimated glacial drift groundwater contours are shown on Figure 5.

2.1.2 Carimona Member of Platteville Formation

Groundwater elevations were also measured in nine Carimona Member monitoring wells (8, 9, 10, 11, 12, RR, SS, UU and WW) on August 13, 1996. The locations of these wells are shown on Figure 6. A summary of 1996 water level monitoring results is presented in Table 2. The estimated Carimona potentiometric surface is shown on Figure 7.

2.1.3 Magnolia Member of Platteville Formation

The potentiometric surface elevations were measured in the Magnolia Member monitoring wells (OO, QQ, TT and VV) on August 13, 1996. The locations of the Magnolia Member monitoring wells are shown on Figure 8 and the estimated potentiometric surface is presented on Figure 9. A summary of 1996 water level monitoring results is presented in Table 3.

A recovery test was performed in August to verify capture areas for Magnolia Pumpout Wells MG1 and MG2.

2.1.4 St. Peter Sandstone

The potentiometric surface elevations were measured in the St. Peter Sandstone monitoring well 200 on August 13, 1996. Figure 10 shows the location of the St. Peter Sandstone monitoring well. A summary of 1996 water level monitoring results is presented in Table 4.

2.2 Water Quality Monitoring

The 1996 monitoring program included the collection of water quality samples from monitoring wells screened in the glacial drift, wells open to the Carimona or Magnolia Members of the Platteville Formation, wells screened in the St. Peter Sandstone, and one well open to the Prairie du Chien/Jordan. All monitoring activities were performed in accordance with the 1994-1999 Operations and Monitoring Plan. The 1994-1999 Operations and Monitoring Plan, included in Appendix C, requires that groundwater samples collected from the glacial drift, Platteville Formation, St. Peter Sandstone, and Prairie du Chien/Jordan wells during even years be analyzed for trichloroethylene (TCE) and during odd years be analyzed for the List 2 Volatile Organic Compounds (VOCs) as listed in Table C-1 of Appendix C. The groundwater samples collected during 1996 were analyzed for trichloroethylene as listed in Table 5.

The groundwater samples collected in 1996 were submitted to Quality Analytical Laboratory (QAL) located in Redding, California. All water quality samples were analyzed using EPA method 601/602. The results of the 1996 analyses are presented in Tables 6 through 10 and Tables 12 through 14. Historical water quality data for the glacial drift, Carimona Member, Magnolia Member, St. Peter Sandstone, Prairie du Chien/Jordan, and pumpout wells, as well as the groundwater treatment system influent and effluent are presented in Appendix B. The laboratory

reports and chain-of-custody forms are in Appendix D. The results from the 1996 water quality monitoring program are discussed in Section 5.0.

2.2.1 Glacial Drift

Groundwater samples were collected from five glacial drift monitoring wells (Q, T, V, W and X) on August 13-14, 1996. The samples were analyzed for TCE as described in the 1994-1999 Operations and Monitoring Plan. The results from the laboratory analyses are presented in Table 6 and the reported concentrations of TCE are shown on Figure 11. The 1985 through 1996 TCE concentrations in samples from Glacial Drift Wells Q, X and V are shown on Figure 12.

2.2.2 Carimona Member of Platteville Formation

Groundwater samples were collected from seven monitoring wells (8, 9, 10, 11, 12, SS and UU) screened in the Carimona Member of the Platteville Formation on August 13-14, 1996. The samples were analyzed for TCE. The results from the laboratory analyses are presented in Table 7. The concentrations of TCE are shown on Figure 13. The 1985 through 1996 TCE concentrations for samples from Carimona Wells 10 and 11 are shown on Figure 14.

2.2.3 Magnolia Member of Platteville Formation

Groundwater samples were collected from two monitoring wells (QQ and TT) open to the Magnolia Member of the Platteville Formation on August 13 and August 14, 1996, respectively. The samples were analyzed for TCE. The results from the laboratory analyses are presented in Table 8. The concentrations of TCE are shown on Figure 15. The 1985 through 1996 TCE concentrations for Magnolia Member Wells QQ and TT are shown on Figure 16.

2.2.4 St. Peter Sandstone

A groundwater sample was collected from Well 200 screened in the St. Peter Sandstone on August 13, 1996. The sample was analyzed for TCE. The results from the laboratory analyses are presented in Table 9 and the concentration of TCE is shown on Figure 17. The 1985 through 1996 TCE concentrations for St. Peter Sandstone Well 200 are shown on Figure 18.

2.2.5 Prairie du Chien/Jordan

A groundwater sample was collected from the Henkel Well, open to the Prairie du Chien/Jordan, on August 14, 1996. The sample was analyzed for TCE. The result from the laboratory analysis is presented in Table 10.

2.2.6 Downgradient Groundwater Pumpout System

Composite samples were collected quarterly (March, July, August, and November 1996) from the downgradient glacial drift pumpout well system (Wells 111, 112 and 113) discharge (Discharge). The samples were analyzed for the List 2 VOCs as listed in Table 11. The results from the laboratory analyses are presented in Table 12. The 1985 through 1996 TCE concentrations for the downgradient groundwater pumpout system discharge are shown on Figure 19.

2.2.7 Site Groundwater Treatment & Groundwater Pumpout System

Groundwater treatment system influent and effluent samples (Influent and Effluent) collected quarterly (March, July, August, and November 1996). Influent to the treatment system is composed of groundwater pumped from Wells 109 and 110. Effluent samples are groundwater pumped from Wells 109 and 110 has passed through the stripper tower and were analyzed for the List 2 VOCs as listed in Table 11. The results from the laboratory analyses are presented in Table 13. The 1985 through 1996 TCE concentrations for the influent and effluent samples are shown on Figure 19.

*No more composite
Sampling -
= cannot assess
clearly
situation @ individual
Samples*

Flow weighted composite samples were collected from Magnolia groundwater pumpout system Wells MG1 and MG2 (MG Effluent) quarterly (March, July, August, and November 1996). Effluent from the wells is discharged to the base of the stripper tower which discharges to the storm sewer. The samples were analyzed for the List 2 VOCs (Table 11). The results from the laboratory analysis are presented in Table 14. The 1993 through 1996 TCE concentrations for the MG effluent discharge are shown on Figure 20.

3.0 Quality Assurance Procedures

Quality assurance samples were collected by Barr Engineering Company and were analyzed by Quality Analytical Laboratories (QAL) during the March, July, August, and November 1996 sampling events. Routine quality assurance procedures were followed during 1996. All samples were analyzed using EPA methodology.

Quality assurance samples analyzed and data reviewed in 1996 included: trip blanks, masked or blind duplicates, laboratory method blanks, surrogate recoveries, matrix spikes, and matrix spike duplicates. The results of blank and blind duplicate sample analyses are presented in Appendix A, Tables A-1 and A-2, respectively.

Quality assurance procedures for sampling and analysis included both internal and external procedures and review. Internal laboratory review procedures are described in the QAL Quality Assurance Manual on file at the MPCA with the Quality Assurance/Quality Control Coordinator. External review and validation were performed by Barr on the data provided by the laboratory.

All analytical data were validated and determined useable and of an acceptable degree of quality. No data qualifiers were added to the data as a result of the data validation.

4.0 Remedial Action Operations

The following sections summarize the remedial action operation and maintenance activities conducted at the East Hennepin Avenue site during 1996. Remedial actions consisted of operation of the groundwater pumpout and treatment system.

4.1 Groundwater Pumpout System

The East Hennepin Avenue site groundwater pumpout system consists of the site glacial drift pumpout system (Wells 109 and 110) located as shown on Figure 5, the site Platteville pumpout system (Wells MG1 and MG2) located as shown on Figure 8, and the downgradient glacial drift pumpout system (Wells 111, 112 and 113) located as shown on Figure 5. The Carimona pumpout well (Well 108) was replaced in 1993 by Wells MG1 and MG2. The performance of each individual pumpout system is discussed in Sections 4.1.1 through 4.1.4. The average monthly pumping rate for each of the pumpout wells is presented in Table 15. The pumpout system operational downtime and percent of operating time for 1996 is shown in Table 16.

4.1.1 Site Glacial Drift

The site glacial drift pumpout system (Wells 109 and 110) is designed to contain and remove groundwater with a TCE concentration exceeding 270 µg/L in the glacial drift as directed in the October 25, 1984 Administrative Consent Order (Consent Order) for the site. The combined average pumping rate for the glacial drift pumpout system (Wells 109 and 110) during 1996 was 88 gallons per minute. The average monthly pumping rates for the individual pumpout wells ranged from 30 to 51 gallons per minute. A total volume of approximately 46 million gallons of groundwater was removed from the glacial drift by the site glacial drift pumpout system.

Groundwater removed by the site glacial drift pumpout system during 1996 was treated by air stripping. The effluent from the air stripper was discharged to the Minneapolis storm sewer system.

4.1.2 Downgradient Glacial Drift

The downgradient glacial drift pumpout system is designed to contain and remove groundwater in the glacial drift with a concentration of TCE exceeding 270 µg/L as specified in the Consent Order.

The downgradient glacial drift pumpout system (Wells 111, 112 and 113) operated at a combined average rate of 287 gallons per minute in 1966. The average monthly pumping rates for the individual pumpout wells ranged from 23 to 115 gallons per minute (Table 15). A total volume of approximately 115 million gallons of groundwater was removed from the glacial drift by the downgradient glacial drift pumpout system during 1996.

Reliable pumping estimates are not available for August and September for Well 112. Erratic meter readings resulted in uncorrectable meter readings. The pump and meter were replaced in October.

Groundwater removed by the downgradient glacial drift pumpout system is discharged to the Minneapolis storm sewer system.

4.1.3 Carimona Member of the Platteville Formation

Carimona pumpout Well 108 has not been operated since 1993 when Wells MG1 and MG2 began operation to capture contaminated groundwater in the Platteville Formation.

4.1.4 Magnolia Member of the Platteville Formation

The Magnolia pumpout system (Wells MG1 and MG2) is designed to contain and remove groundwater with a concentration of TCE exceeding 27 µg/L from both the Magnolia and Carimona Members of the Platteville Formation. Wells MG1 and MG2 operated at a combined average rate of 204 gallons per minute in 1996. The average monthly pumping rates for the individual pumpout wells ranged from 92 to 106 gallons per minute. A total volume of approximately 106 million gallons was removed from the Platteville Formation during 1996 (Table 15).

A 24-hour aquifer recovery test was performed on August 13-14, 1996 to verify capture areas for the Magnolia Member pumpout system. The pumpout wells were shut-down for 24 hours. Water levels were measured in Carimona Member Wells RR, SS and WW and Magnolia Member Wells



OO, TT and VV prior to shut down and 24 hours after shut-down. Water level recoveries for these wells ranged from 1.93 to 8.13 feet (Table 17). The recovery test is discussed in detail in Section 5.7.

4.2 Maintenance and Downtime

The pumpout wells were operated continuously at the maximum sustainable yield of the pumps or aquifer during 1996, except for shutdowns caused by electrical or mechanical failures, and the need for well and system maintenance.

Maintenance of Glacial Drift Wells 109 and 110 during April consisted of repairs to the hour meters. Maintenance of Magnolia Wells MG1 and MG2 during April consisted of repairs to the flow meters. Well 111 was off-line for about 11 days during May in order to replace a defective pump. Wells MG1 and MG2 were off-line for approximately one day during August due to pump malfunctions. Maintenance of the flow meter and pump in Well 112 during October resulted in one day of downtime. Pump failure in Well 109 during November resulted in less than one day of downtime for repairs.

Operation downtime occurring during 1996 for the Glacial Drift and Magnolia pumpout wells is summarized in Table 16.

4.3 Groundwater Treatment System

The groundwater treatment system consists of an on-site air stripping tower. The tower is designed to remove 99 percent of volatile organic compounds from influent groundwater at a discharge rate of 150 gallons per minute. The groundwater treatment system operated continuously during 1996.

5.0 Discussion of Results

This section discusses the water quality results for samples collected from the glacial drift, Carimona and Magnolia Members of the Platteville Formation, St. Peter Sandstone, and Prairie du Chien/Jordan monitoring wells. The water quality results for groundwater pumpout system wells, and the groundwater treatment system are also discussed in this section. Historical water quality data for each sample location are provided in Appendix B.

Graphical representations of the historical trichloroethylene concentrations for the glacial drift, Carimona Member, Magnolia Member, St. Peter Sandstone, and down gradient pumpout system wells and the groundwater treatment system are presented on Figures 12, 14, 16, 18 and 19, respectively.

The glacial drift and Platteville monitoring systems are focused on indicator wells selected to monitor pumpout system effectiveness. Several wells within the containment zone of the glacial drift and Platteville pumpout systems likely representative of current conditions are consequently not monitored. Historical water quality results for these wells are in Appendix B.

Glacial drift Wells B, 3 and S were last monitored in 1993. These wells are no longer monitored because the wells are located in the capture zone of the existing pumpout system. Historical water quality data for these wells are in Table B-6 of Appendix B.

Carimona Member Wells BB and WW were last monitored in 1993. These wells are no longer monitored because the wells are located in the capture zone of the existing pumpout system. Historic water quality data for these wells are in Table B-7 of Appendix B.

Magnolia Member Wells VV and ZZ were also last monitored in 1993. These wells are no longer monitored because the wells are located in the capture zone of the existing pumpout system. Historic water quality data for these wells are in Table B-8 of Appendix B.



5.1 Glacial Drift

The results from the analyses of groundwater samples collected from the glacial drift during 1996 indicate that TCE concentrations were less than the laboratory reporting limit for Wells Q, T and X. Concentrations of 100 µg/L and 1.4 µg/L were reported for Wells V and W, respectively (Table 6).

The results from the analyses of groundwater samples collected from the Glacial Drift Wells Q, W and X indicate that TCE concentrations have decreased since the startup of the site glacial drift pumpout system in 1985. The results from the analyses of groundwater samples from Glacial Drift Well T have been below the laboratory reporting limit since the startup of the pumpout system. The analysis of the groundwater sample from Well V during 1996 indicates a TCE concentration similar to recent water quality data collected from this well (Figure 12). This indicates that the glacial drift pumpout systems are meeting the Consent Order requirements.

The groundwater elevations indicate that the direction of groundwater flow in the glacial drift is to the southwest. The data indicate that 1996 groundwater elevations are similar to historical water elevations. Water level measurements collected during 1985 and 1986 following startup of the groundwater pumpout systems demonstrated the effectiveness of the site and downgradient glacial drift pumpout systems in containing the glacial drift groundwater in areas where TCE concentrations exceed 270 µg/L. Glacial drift groundwater elevations collected during 1996 indicate that the containment zone established during 1985 and 1986 has been maintained.

5.2 Carimona Member of Platteville Formation

The results from the analysis of groundwater samples collected from the Carimona indicate TCE concentrations were less than the laboratory reporting limit for Well 12. TCE concentrations of 2.2 µg/L, 47 µg/L, 35 µg/L, 3.0 µg/L, 24 µg/L and 17 µg/L were measured in samples collected from Wells SS, UU, 8, 9, 10 and 11, respectively.

As shown in Table B-7 included in Appendix B, the results from the analyses of groundwater samples collected from Carimona Member Wells 8, 9 and 10 indicate that TCE concentrations have generally declined since the startup of the Carimona Member groundwater recovery system in 1985. The results from the analyses of groundwater samples collected from Wells SS and 12 during 1996 indicate TCE concentrations similar to recent results, which are generally among the

lowest of the Carimona monitoring wells. The reported 1996 concentration for Well UU is slightly higher than reported in recent years; however, the 1996 TCE concentration is lower than the concentration of 64 µg/L measured in 1991 for Well UU and consistent with historical variations. The results from the analyses of groundwater samples collected from Well 11 during 1985 through 1996 show considerable variability. The TCE concentration in samples from Well 11 range from below the laboratory detection limit (May 1990) to 520 µg/L (December 1985) to 17 µg/L in August 1996. The TCE concentrations reported for Wells 10 and 11 starting from 1986 through 1996 are shown on Figure 16.

Two years after shutting down Carimona Pumpout Well 108 and starting up Magnolia Pumpout Wells MG1 and MG2, water levels in the Carimona monitoring wells were generally comparable to those measured recently. The potentiometric data (Figure 7) indicate that water levels in the Carimona are relatively uniform with the exception of water levels measured in Well SS.

5.3 Magnolia Member of Platteville Formation

The results from the analyses of samples from Magnolia Member wells indicate concentrations of 1.0 µg/L for Well TT and 2.2 µg/L for Well QQ.

The results from the analyses of samples from the Magnolia Member monitoring indicate that TCE concentrations have generally decreased in Well TT since the system was turned on. The TCE concentration in Well QQ is similar to recent results (Table B-8) and remains below the consent order requirement of 27 µg/L.

T - NO!
ST. Peter
↑ levels!

The potentiometric surface elevations measured in August 1996 are similar to water elevations measured since the Magnolia pumpout system began operation. The measured potentiometric surface in the Magnolia has been a few feet lower since the onset of Magnolia pumpout operations.

5.4 St. Peter Sandstone

The result from the analysis of the groundwater sample collected from St. Peter Well 200 during 1996 indicate that the TCE concentration was 110 µg/L, as shown in Table 9. The 1996 result was similar to historical results.

The 1996 potentiometric surface elevation measured in the St. Peter monitoring well is consistent with the potentiometric surface elevations measured during prior years.

5.5 Prairie du Chien/Jordan

The result from the analysis of the groundwater sample collected from the Henkel Well during 1996 indicates a TCE concentration of 9.2 µg/L (Table 10). The 1996 result is within the range of results measured from 1985 to 1995.

5.6 Downgradient Pumpout System

The average TCE concentration measured in samples collected during 1996 from the downgradient pumpout system discharge was 60 µg/L, and the average total VOC concentration was 65 µg/L. Quarterly sampling results are shown in Table 12. Figure 19 shows the results from the analyses of discharge samples collected from 1985 through 1996 which indicate that the 1996 TCE concentrations are similar to historical results.

The 1996 results indicate that the downgradient pumpout system is effective in containing glacial drift groundwater with a concentration of TCE exceeding 270 µg/L.

5.7 Site Groundwater Pumpout Systems

The results from the analyses of samples collected in 1996 from the site glacial drift pumpout system indicate that the average influent TCE concentration was 380 µg/L and that the average total VOC concentration was 430 µg/L (Table 13). The results from the analyses of influent samples collected during 1996 indicate that TCE concentrations have decreased since startup of the pumpout system in 1985 but appear to have stabilized since about 1988 (Figure 19).

The laboratory results also indicate that TCE remains the primary volatile organic compound in the groundwater downgradient of the East Hennepin Avenue site.

The results from the analyses of samples collected in 1996 from the Magnolia pumpout system discharge indicate an average TCE concentration of 20 µg/L and an average total VOC concentration of 21 µg/L (Table 14).

Groundwater modeling contained in Appendix D of the 1993 annual report (Barr, 1993) indicated that pumping rates of 95 gpm for Wells MG1 and MG2 will effectively capture groundwater potentially impacted by the site in both the Carimona and Magnolia members. Average annual pumping rates were above 95 gpm for both wells in 1996.

A 24-hour recovery test was performed in the Magnolia Member wells on August 13–14, 1996. The test was performed as outlined in the 1994-1999 Operations and Monitoring Plan. The purpose of the test was to determine if Magnolia member pumpout Wells MG1 and MG2 are maintaining an adequate capture zone in the Platteville Formation. The recovery test involved measuring water levels in Wells RR, SS, VV, OO, TT and WW prior to and 24 hours after a shutdown of pumpout Wells MG1 and MG2. Comparison of the 1992 drawdown data with the 1996 recovery data indicates that for each monitoring well, the recovery exceeds the initial drawdown measured during system startup. The exceedances range from 0.32 feet in Well WW to 2.33 feet in Well SS (Table 17). Since all wells exceed the drawdown measured during the startup monitoring, it is concluded that the pumpout system is maintaining and possibly exceeding the capture zone originally predicted. This pumping data, combined with the recovery test data, affirm that Pumpout Wells MG1 and MG2 are effectively capturing Platteville Formation groundwater potentially impacted by the East Hennepin Avenue Site.

5.8 Site Groundwater Treatment System

During 1996, the stripper tower received influent from site glacial drift pumpout Wells 109 and 110. Influent and effluent data are summarized in Table 13.

The results from the analyses of samples collected in 1996 from the treatment system effluent indicate that the average annual TCE concentration was 25.9 µg/L and a maximum daily TCE concentration was 64 µg/L. The NPDES Permit Limit is an annual average effluent TCE concentration of 50 µg/L with a daily maximum limit of 100 µg/L. Treated effluent met both of these standards. The stripper packing material was changed in October 1995. Treatment system removal efficiency since then was 99.5 percent for the fourth quarter of 1995, 89 percent for the first quarter of 1996, 99.8 percent for the second quarter of 1996, 83.6 percent for the third quarter of 1996, and 100 percent for the fourth quarter of 1996. The average treatment system removal efficiency since changing the stripper packing material has been 94.4 percent.

The NPDES Permit Limit is 95 percent removal on a daily basis and 98 percent on an annual basis. Treatment system efficiency was greater than 99 percent in the second and fourth quarters of 1996. Unexpectedly high first and third quarter effluent concentrations, which were still within the effluent discharge standard, resulted in a quarterly treatment efficiency of 89 percent for the first quarter and 83.6 percent for the third quarter. This caused the annual treatment efficiency to drop below 95 percent. The measured treated effluent TCE concentration from the monitoring events following both of those quarters had returned to very low or below detection limit levels, and the treatment efficiency was well above 95 percent.

In the past, elevated effluent TCE (or VOC) concentrations have been associated with stripper packing fouling. As described previously, the packing material was replaced in October 1995. Historically the new packing material has functioned effectively for at least two years. The fourth quarter 1996 effluent monitoring results indicate that the stripper is still functioning properly. Additionally, increased blower back pressure, another indication of stripper fouling, has not been measured. Due to detection of intermittent unusually high VOC concentrations, General Mills is in the process of evaluating stripper tower performance. Alternative operating practices and systems are being investigated.

6.0 Summary and Conclusions

6.1 Glacial Drift

Water quality and water level data indicate continued containment of groundwater with a TCE concentration exceeding 270 µg/L in the glacial drift by the site and downgradient glacial drift pumpout systems.

6.2 Carimona Member

The Carimona Member acts as a leaky confining layer above the Magnolia Member. A variable hydraulic connection exists between the Carimona Member and Magnolia Member. The Magnolia Member pumpout wells have a greater influence on the vertical gradient from the Carimona Member to the Magnolia Member than did the former Carimona Pumpout Well 108. The increased hydraulic gradient causes increased leakage from the Carimona Member into the Magnolia Member. The Magnolia Member Pumpout Wells MG1 and MG2 effectively act as containment wells for groundwater in the Carimona Member.

6.3 Magnolia Member

Magnolia Member water levels measured from the monitoring well network indicate that Pumpout Wells MG1 and MG2 are effectively capturing groundwater in the Platteville Formation including both the Carimona and the Magnolia Member.

6.4 St. Peter Sandstone

Water quality data collected from the St. Peter Well indicate the continued presence of TCE in the St. Peter at concentrations similar to historical results.

6.5 Prairie du Chien/Jordan

Water quality data collected from the Henkel Well indicate the continued presence of TCE in the Prairie du Chien/Jordan at concentrations similar to historical results.

7.0 Recommendations

1. Continue operation of the site pumpout and groundwater treatment systems and the downgradient glacial drift pumpout systems in accordance with the 1985 Consent Order; the 1985 groundwater pumpout system plan; the Department of Natural Resources Water Appropriation Permits; and the 1994-1999 Operations and Monitoring Plan (Appendix C).
2. Inspect and maintain the groundwater pumpout and treatment systems.
3. Continue to submit data on a quarterly basis.
4. Monitor groundwater elevations and groundwater quality in accordance with the 1994-1999 Operations and Monitoring Plan.
5. Add vinyl chloride to annual monitoring wells sampling requirements for 1997. If results are non-detect, we propose to cease analyzing samples for vinyl chloride.
6. Evaluate stripper tower performance and alternative operating practices/systems. We will provide recommendations for reducing higher than normal effluent TCE concentrations.

References

October 25, 1984, Administrative Consent Order.

Barr Engineering Company. *1995 Annual Report, East Hennepin Avenue Site*, prepared for General Mills, Inc, February 1996.

Barr Engineering Company. *1993 Annual Report, East Hennepin Avenue Site*, prepared for General Mills, Inc., 1994

Tables

TABLE 1

1996 GROUNDWATER ELEVATIONS
GLACIAL DRIFT WELLS

(elevations in feet/MSL)

| | Q | T | V | W | X |
|----------|--------|--------|--------|--------|--------|
| DATE | ----- | ----- | ----- | ----- | ----- |
| 08/13/96 | 828.23 | 833.30 | 815.94 | 816.10 | 822.86 |
| ----- | | | | | |
| 2, .001 | | | | | |
| 12/12/96 | | | | | |

TABLE 2

1996 GROUNDWATER ELEVATIONS
CARIMONA MEMBER WELLS

(elevations in feet/MSL)

| | 8 | 9 | 10 | 11 | 12 |
|----------|--------|--------|--------|--------|--------|
| DATE | ----- | ----- | ----- | ----- | ----- |
| 08/13/96 | 827.95 | 828.16 | 827.94 | 827.99 | 827.20 |

| | RR | SS | UU | WW |
|----------|--------|--------|--------|--------|
| DATE | ----- | ----- | ----- | ----- |
| 08/13/96 | 828.14 | 821.98 | 827.95 | 828.01 |

2, .002
12/13/96

TABLE 3

1996 GROUNDWATER ELEVATIONS
MAGNOLIA MEMBER WELLS

(elevations in feet/MSL)

| DATE | OO | QQ | TT | VV |
|----------|--------|--------|--------|--------|
| | ----- | ----- | ----- | ----- |
| 08/13/96 | 818.66 | 818.66 | 816.01 | 820.74 |
| ----- | | | | |
| 2, .003 | | | | |
| 12/12/96 | | | | |

TABLE 4

1996 GROUNDWATER ELEVATIONS
ST. PETER SANDSTONE WELLS

(elevations in feet/MSL)

| | 200 |
|----------|--------|
| DATE | ----- |
| 08/13/96 | 762.45 |
| ----- | |
| 2, .018 | |
| 12/12/96 | |

Table 5

**Groundwater Monitoring System
1996 Water Quality Analytical Parameters**

Chlorinated Volatile Organic Compounds

Trichloroethylene

TABLE 6

1996 WATER QUALITY DATA
GLACIAL DRIFT WELLS

(concentrations in ug/L)

| | Q | T | V | W | X |
|-------------------|----------|----------|----------|----------|----------|
| | ----- | ----- | ----- | ----- | ----- |
| | 08/14/96 | 08/14/96 | 08/14/96 | 08/14/96 | 08/13/96 |
| Trichloroethylene | <0.5 | <0.5 | 100 | 1.4 | <0.5 |

.001
12/12/96

TABLE 7

1996 WATER QUALITY DATA
CARIMONA MEMBER WELLS

(concentrations in ug/L)

| | SS | UU | 8 | 10 | 9 | 11 | 12 |
|-------------------|----------|----------|----------|----------|----------|----------|----------|
| | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| | 08/14/96 | 08/14/96 | 08/13/96 | 08/13/96 | 08/13/96 | 08/14/96 | 08/13/96 |
| Trichloroethylene | 2.2 | 47 | 35 | 24 | 3.0 | 17 | <0.5 |
| ----- | | | | | | | |
| .002 | | | | | | | |
| 12/12/96 | | | | | | | |

TABLE 8

1996 WATER QUALITY DATA
MAGNOLIA MEMBER WELLS

(concentrations in ug/L)

| | QQ | TT |
|-------------------|----------|----------|
| | ----- | ----- |
| | 08/13/96 | 08/14/96 |
| Trichloroethylene | 2.2 | 1.0 |
| ----- | | |
| .003 | | |
| 12/13/96 | | |

TABLE 9

1996 WATER QUALITY DATA
ST. PETER SANDSTONE WELL

(concentrations in ug/L)

200

08/13/96

Trichloroethylene

96

.004
12/13/96

TABLE 10

1996 WATER QUALITY DATA
PRAIRIE DU CHIEN/JORDAN WELL

(concentrations in ug/L)

HENKEL

08/14/96

Trichloroethylene

9.2

.005

12/13/96

Table 11

**Groundwater Pumpout and Treatment System
1996 Water Quality Parameters**

Chlorinated Volatile Organic Compounds

1,1-Dichloroethane
1,2-Dichloroethane
1,2-Dichloroethylene, cis
1,2-Dichloroethylene, trans
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
1,1,1-Trichloroethane
Trichloroethene

Non-Chlorinated Volatile Organic Compounds

Benzene
Toluene
Xylenes

TABLE 12

1996 WATER QUALITY DATA
DOWNGRADIANT GLACIAL DRIFT PUMP-OUT SYSTEM

(concentrations in ug/L)

| | DISCHARGE (1) | | | |
|-----------------------------|---------------|----------|----------|----------|
| | 03/11/96 | 07/02/96 | 08/13/96 | 11/04/96 |
| 1,1-Dichloroethane | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethane | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethylene, cis | 3.0 | 5.7 | 2.5 | 5.6 |
| 1,2-Dichloroethylene, trans | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,1,1,2-Tetrachloroethane | <0.50 | <0.5 | <0.5 | <0.5 |
| Tetrachloroethylene | 0.76 | 1.2 | 0.63 | 0.6 |
| 1,1,1-Trichloroethane | 0.53 | 0.62 | 0.77 | 0.6 |
| Trichloroethylene | 63 | 77 | 40 | 59 |
| Benzene | <0.50 | <0.5 | <0.5 | <0.5 |
| Toluene | <0.50 | <0.5 | <0.5 | <0.5 |
| Xylenes | <0.50 | <0.5 | <0.5 | <0.5 |
| Sum Volatile Organics | 67 | 85 | 43 | 66 |

(1) Pump-out wells 111, 112, 113.
.006
12/19/96

TABLE 13

1996 WATER QUALITY DATA
SITE GLACIAL DRIFT PUMP-OUT AND TREATMENT SYSTEMS

(concentrations in ug/L)

| | INFLUENT (1) | | | |
|-----------------------------|--------------|----------|----------|----------|
| | 03/11/96 | 07/02/96 | 08/13/96 | 11/04/96 |
| 1,1-Dichloroethane | 1.5 | 1.2 | 1.3 | <2 |
| 1,2-Dichloroethane | <0.50 | <0.5 | <0.5 | <2 |
| 1,2-Dichloroethylene, cis | 33 | 47 | 37 | 24 |
| 1,2-Dichloroethylene, trans | <0.50 | 0.63 | <0.5 | <2 |
| 1,1,2,2-Tetrachloroethane | <0.50 | <0.5 | <0.5 | <2 |
| Tetrachloroethylene | 4.9 | 6.0 | 6.3 | 3 |
| 1,1,1-Trichloroethane | 1.1 | 1.1 | 1.2 | <2 |
| Trichloroethylene | 360 | 390 | 400 | 370 |
| Benzene | 1.0 | <0.5 | 1.3 | <2 |
| Toluene | 7.4 | 5.4 | 12 | <2 |
| Xylenes | 3.0 | <0.5 | 4.0 | <2 |
| Sum Volatile Organics | 410 | 450 | 460 | 400 |

| | EFFLUENT (2) | | | |
|-----------------------------|--------------|----------|----------|----------|
| | 03/11/96 | 07/02/96 | 08/13/96 | 11/04/96 |
| 1,1-Dichloroethane | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethane | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethylene, cis | 8.4 | <0.5 | 12 | <0.5 |
| 1,2-Dichloroethylene, trans | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,1,2,2-Tetrachloroethane | <0.50 | <0.5 | <0.5 | <0.5 |
| Tetrachloroethylene | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,1,1-Trichloroethane | <0.50 | <0.5 | <0.5 | <0.5 |
| Trichloroethylene | 38 | 1.0 | 64 | <0.5 |
| Benzene | <0.50 | <0.5 | <0.5 | <0.5 |
| Toluene | <0.50 | <0.5 | <0.5 | <0.5 |
| Xylenes | <0.50 | <0.5 | <0.5 | <0.5 |
| Sum Volatile Organics | 46 | 1.0 | 76 | ND |

ND Not detected.

(1) Pump-out wells 109, 110.

(2) Effluent from groundwater treatment system.

3,7001

12/19/96

TABLE 14

1996 WATER QUALITY DATA
MAGNOLIA PUMP-OUT SYSTEM

(concentrations in ug/L)

| | MG EFFLUENT (1) | | | |
|-----------------------------|-----------------|----------|----------|----------|
| | 03/11/96 | 07/02/96 | 08/13/96 | 11/04/96 |
| 1,1-Dichloroethane | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethane | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethylene, cis | 1.1 | 1.0 | 1.0 | 0.8 |
| 1,2-Dichloroethylene, trans | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,1,2,2-Tetrachloroethane | <0.50 | 0.85 | <0.5 | <0.5 |
| Tetrachloroethylene | <0.50 | <0.5 | <0.5 | <0.5 |
| 1,1,1-Trichloroethane | <0.50 | <0.5 | <0.5 | <0.5 |
| Trichloroethylene | 18 | 21 | 19 | 22 |
| Benzene | <0.50 | <0.5 | <0.5 | <0.5 |
| Toluene | <0.50 | <0.5 | <0.5 | <0.5 |
| Xylenes | <0.50 | <0.5 | <0.5 | <0.5 |
| Sum Volatile Organics | 19 | 23 | 20 | 23 |

(1) Pump-out wells, MG1 and MG2.
.007
12/19/96

Table 15
Pumpout Wells
1996 Pumping Rates

| | Glacial Drift Pumpout Well Average Pumping Rate (gpm) | | | | | Magnolia Pumpout Well Average Pumping Rate (gpm) | |
|-----------------------------------|--|------|-------|---------------------|-------|---|-------|
| | 109 | 110 | 111 | 112 | 113 | MG1 | MG2 |
| January 1996 | 36.1 | 47.8 | 102.0 | 46.1 | 114.7 | 102.1 | 104.0 |
| February 1996 | 37.0 | 44.7 | 102.0 | 100 | 114.8 | 102.3 | 92.4 |
| March 1996 | 44.0 | 44.4 | 102.2 | 86.9 | 114.3 | 101.8 | 101.8 |
| April 1996 | 47.3 | 47.2 | 101.8 | 86.7 | 111.5 | 101.3 | 105.1 |
| May 1996 | 41.0 | 49.1 | 51.8 | 90.4 | 111.8 | 100.7 | 106.4 |
| June 1996 | 37.3 | 49.1 | 110.6 | 84.4 | 106.1 | 100.3 | 106.0 |
| July 1996 | 46.2 | 50.4 | 111.6 | 89.5 | 105.4 | 100.2 | 105.8 |
| August 1996 | 43.2 | 50.3 | 111.6 | — | 106.6 | 100.5 | 105.6 |
| September 1996 | 38.7 | 50.4 | 112.6 | — | 106.6 | 99.5 | 105.5 |
| October 1996 | 36.4 | 50.2 | 112.8 | 23.0 ⁽¹⁾ | 106.3 | 99.5 | 105.4 |
| November 1996 | 30.0 | 50.6 | 112.9 | 95.9 | 105.8 | 99.8 | 105.4 |
| December 1996 | 32.1 | 51.0 | 112.8 | 92.7 | 105.7 | 100.6 | 95.2 |
| Annual Avg. Pumping Rate (gpm) | 39 | 49 | 105 | 87 | 109 | 101 | 103 |

— Meter malfunction; estimated reading is not reliable.

(1) Well and meter failure. Reading is from temporary replacement meter.

Table 16

**Pumpout Wells
1996 Operation Downtime**

| | Glacial Drift Pumpout Well Downtime (Days) | | | | | Magnolia Pumpout Well Downtime (Days) | |
|-------------------------------|--|---------------------|---------------------|--------------------|-----|---|---------------------|
| | 109 | 110 | 111 | 112 | 113 | MG1 | MG2 |
| January 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| February 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| March 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| April 1996 | 0.04 ⁽¹⁾ | 0.04 ⁽¹⁾ | 0 | 0 | 0 | 0.04 ⁽²⁾ | 0.04 ⁽²⁾ |
| May 1996 | 0 | 0 | 10.8 ⁽³⁾ | 0 | 0 | 0 | 0 |
| June 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| July 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| August 1996 | 0 | 0 | 0 | 0 | 0 | 1.0 ⁽⁴⁾ | 1.0 ⁽⁴⁾ |
| September 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| October 1996 | 0 | 0 | 0 | 1.0 ⁽⁵⁾ | 0 | 0 | 0 |
| November 1996 | 0.8 ⁽⁶⁾ | 0 | 0 | 0 | 0 | 0 | 0 |
| December 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent (%) Operating Time | 99.8 | 100 | 97 | 99.7 | 100 | 99.7 | 99.7 |

- (1) Pump inoperational due to repairs made to hour meter.
- (2) Pump inoperational due to repairs made to flow meter.
- (3) Pump inoperational due to replacement of defective pump.
- (4) Pump inoperational due to pump malfunctions.
- (5) Pump inoperational due to meter and pump failure.
- (6) Pump inoperational due to pump failure.

Table 17

Recovery Test Comparison Summary

| Well | Pumping Levels in Ft. MSL | | Non-Pumping | | Recovery (ft) 8/14/96 | Drawdown (ft) 1992 Test | Δ^1 (ft) |
|------|---------------------------|--------------------------|-------------|---------|-----------------------------|-------------------------------|--------------------|
| | 10/1/92 (for 8 days) | 8/13/96 (for 4 years) | 9/22/92 | 8/14/96 | | | |
| RR | 828.21 | 828.14 | 829.81 | 830.07 | 1.93 | 1.60 | 0.33 |
| OO | 819.64 | 818.66 | 825.69 | 825.92 | 7.26 | 6.05 | 1.21 |
| SS | 824.57 | 821.98 | 827.31 | 827.05 | 5.07 | 2.74 | 2.33 |
| TT | 816.65 | 816.01 | 823.22 | 824.14 | 8.13 | 6.57 | 1.56 |
| VV | 821.33 | 820.74 | 826.96 | 826.77 | 6.03 | 5.23 | 0.80 |
| WW | 828.08 | 828.01 | 829.71 | 829.96 | 1.95 | 1.63 | 0.32 |

Δ^1 = Recovery (9/26/95) - Drawdown (1992 test)

Figures

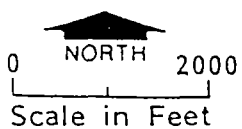
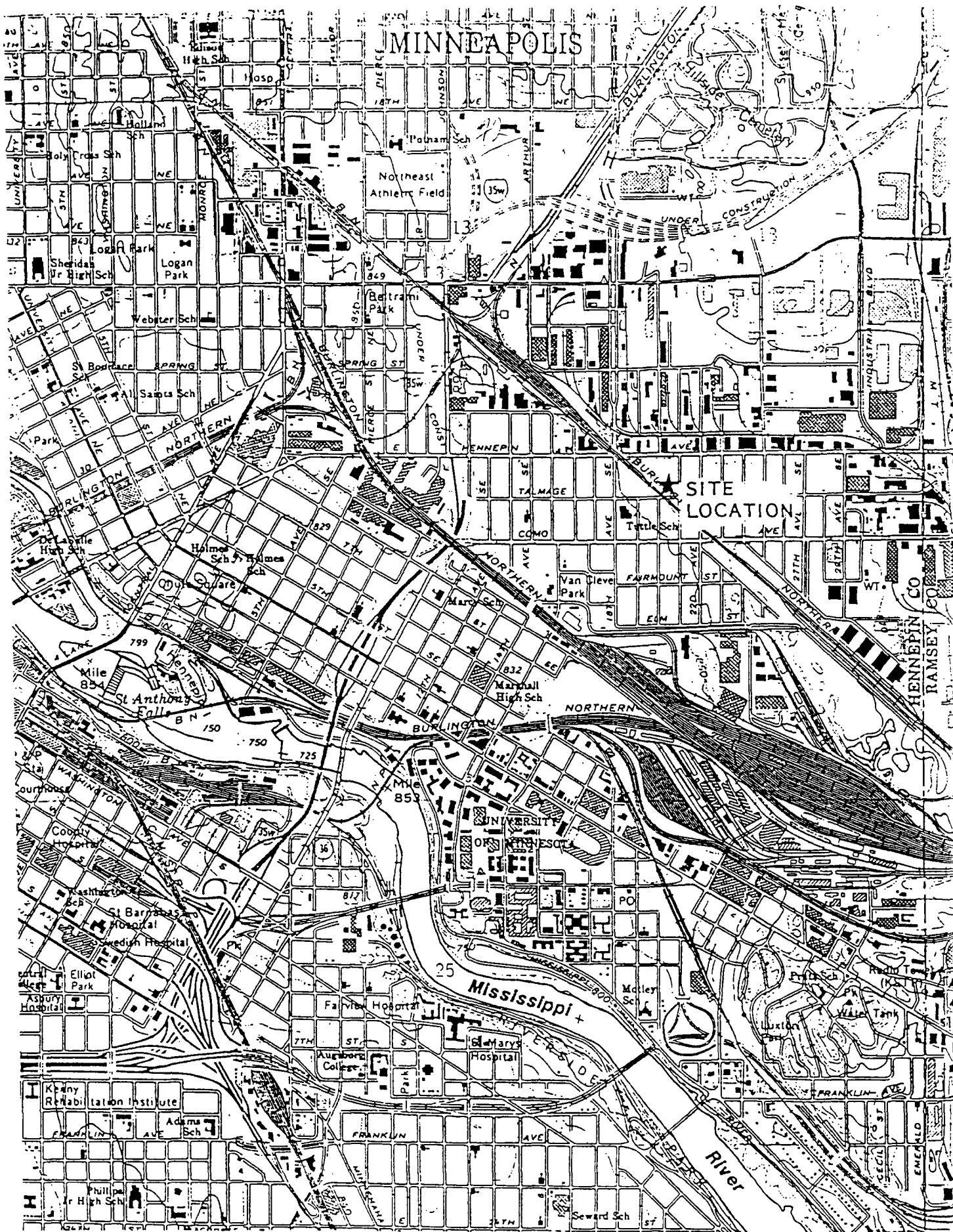
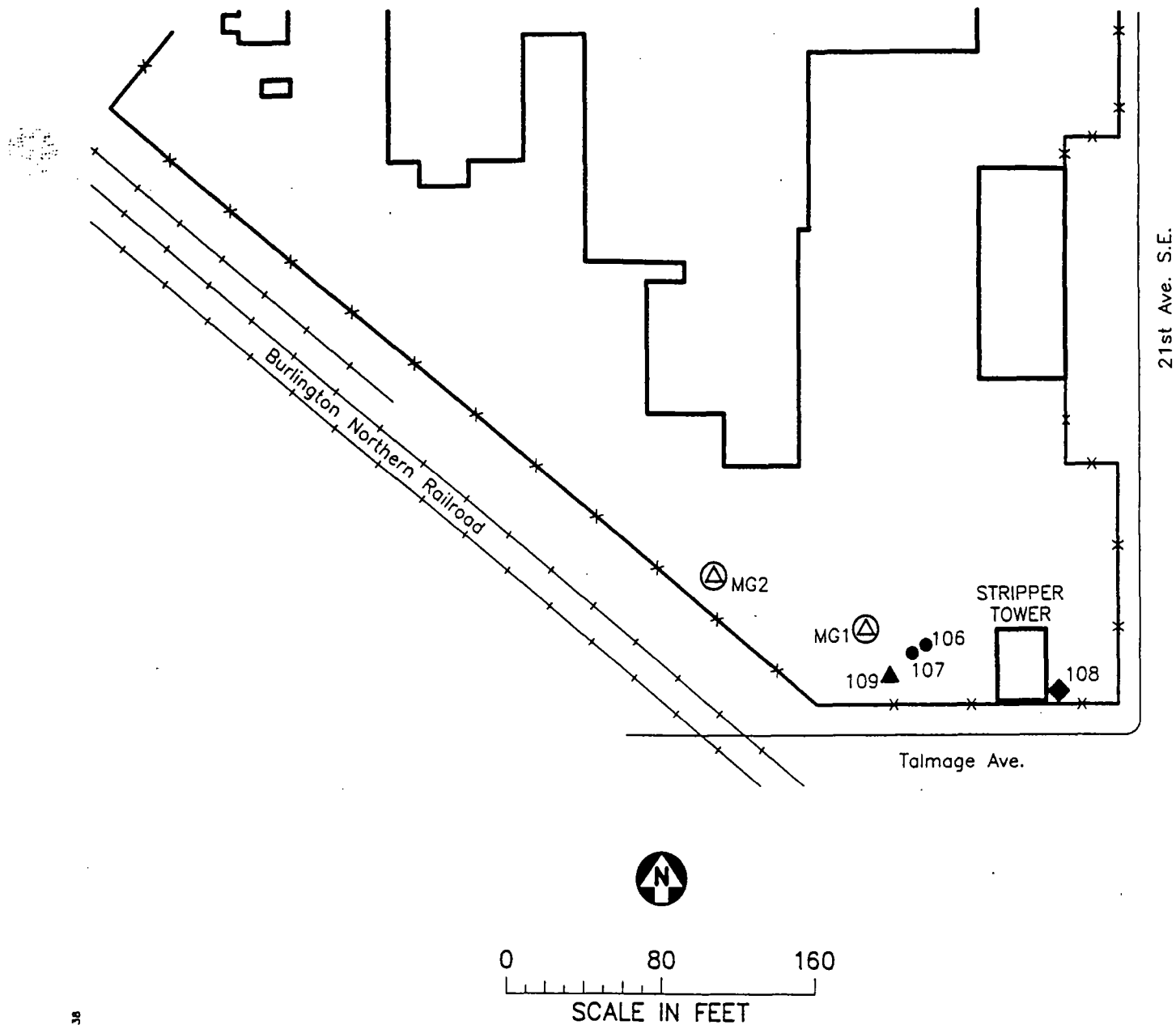


Figure 1
EAST HENNEPIN AVENUE SITE
REGIONAL LOCATION MAP



- ▲ Glacial Drift Pump-Out Well
- ◆ Carimona Member Pump-Out Well
(Shut Down September 1992)
- ⊠ Magnolia Member Pump-Out Well
- Monitoring Well

Figure 2
EAST HENNEPIN AVENUE
SITE MAP

12:37:36

C:\PROJECTS\2327169\SITE\MAP 1.0000 01/24/1994

Jon Moss

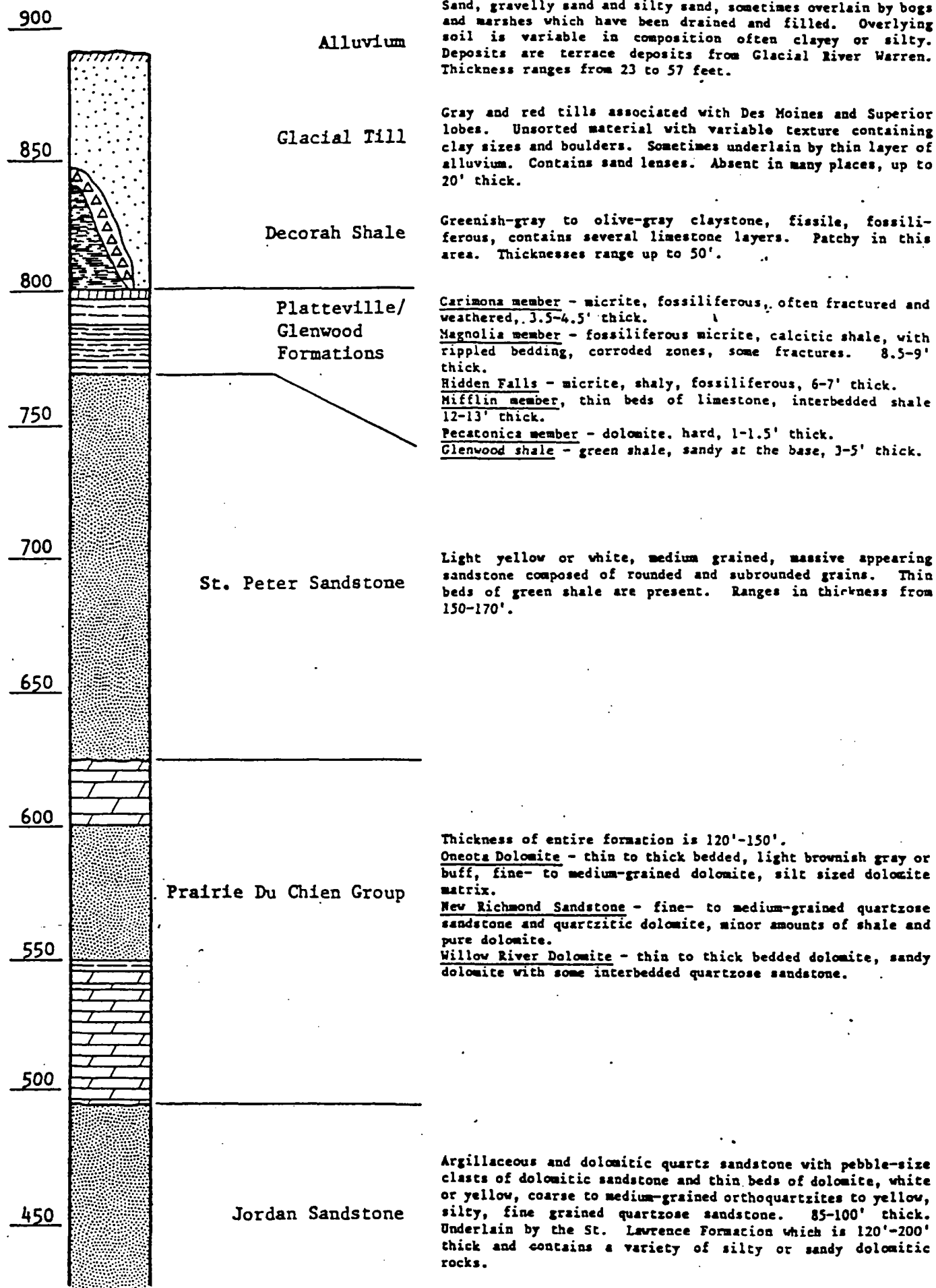


Figure 3
GENERALIZED GEOLOGIC COLUMN

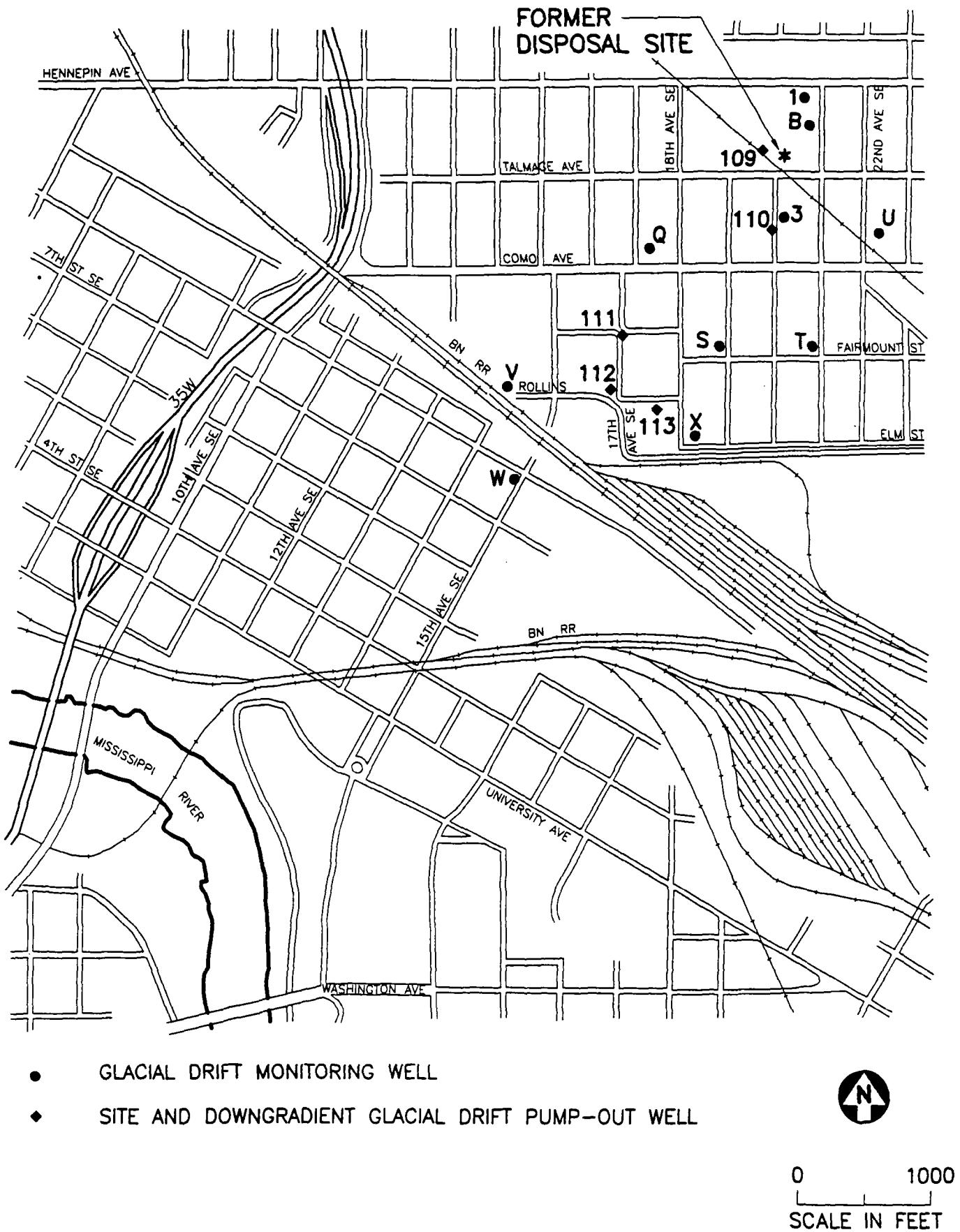


Figure 4
MONITORING WELL LOCATIONS
GLACIAL DRIFT AQUIFER

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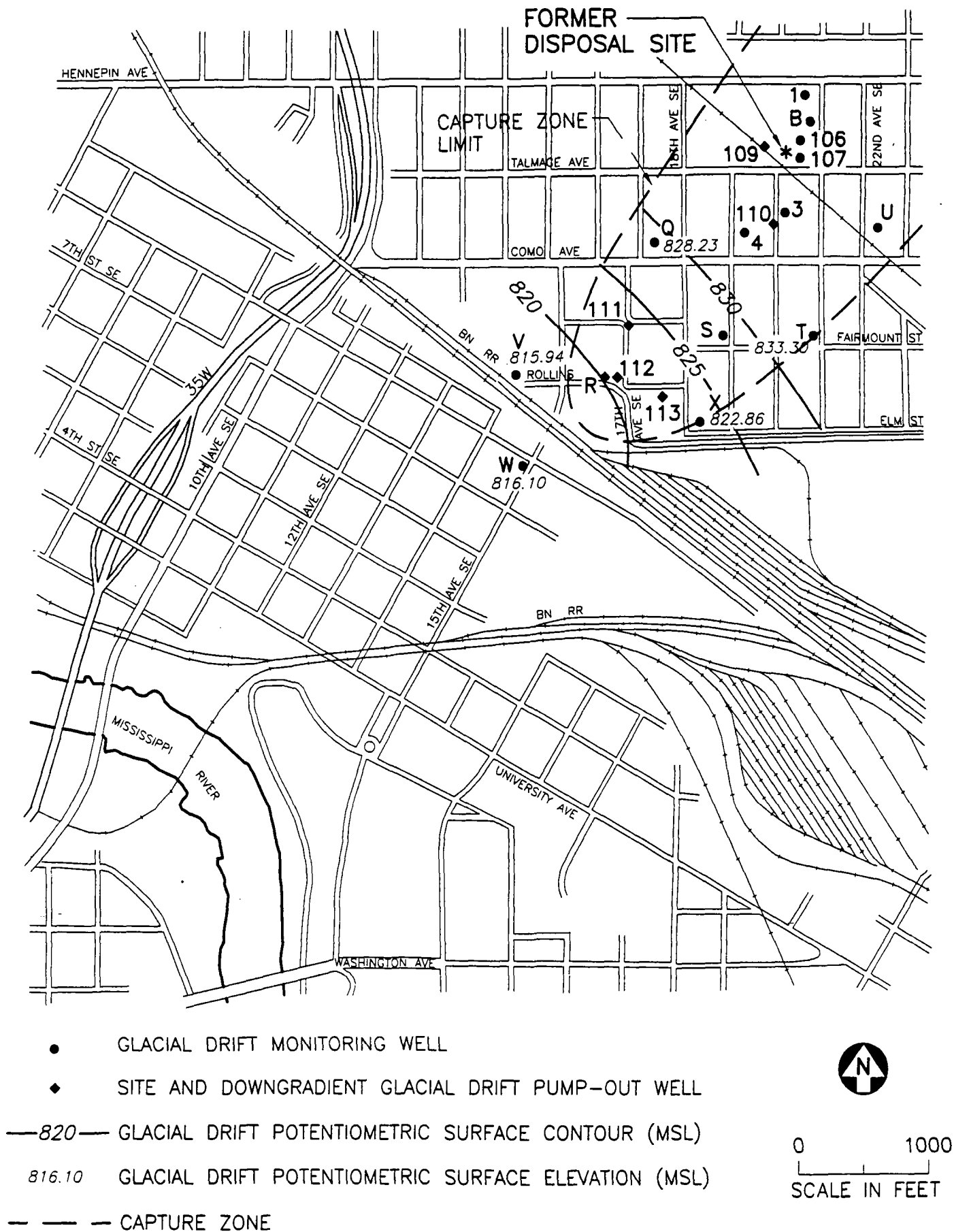
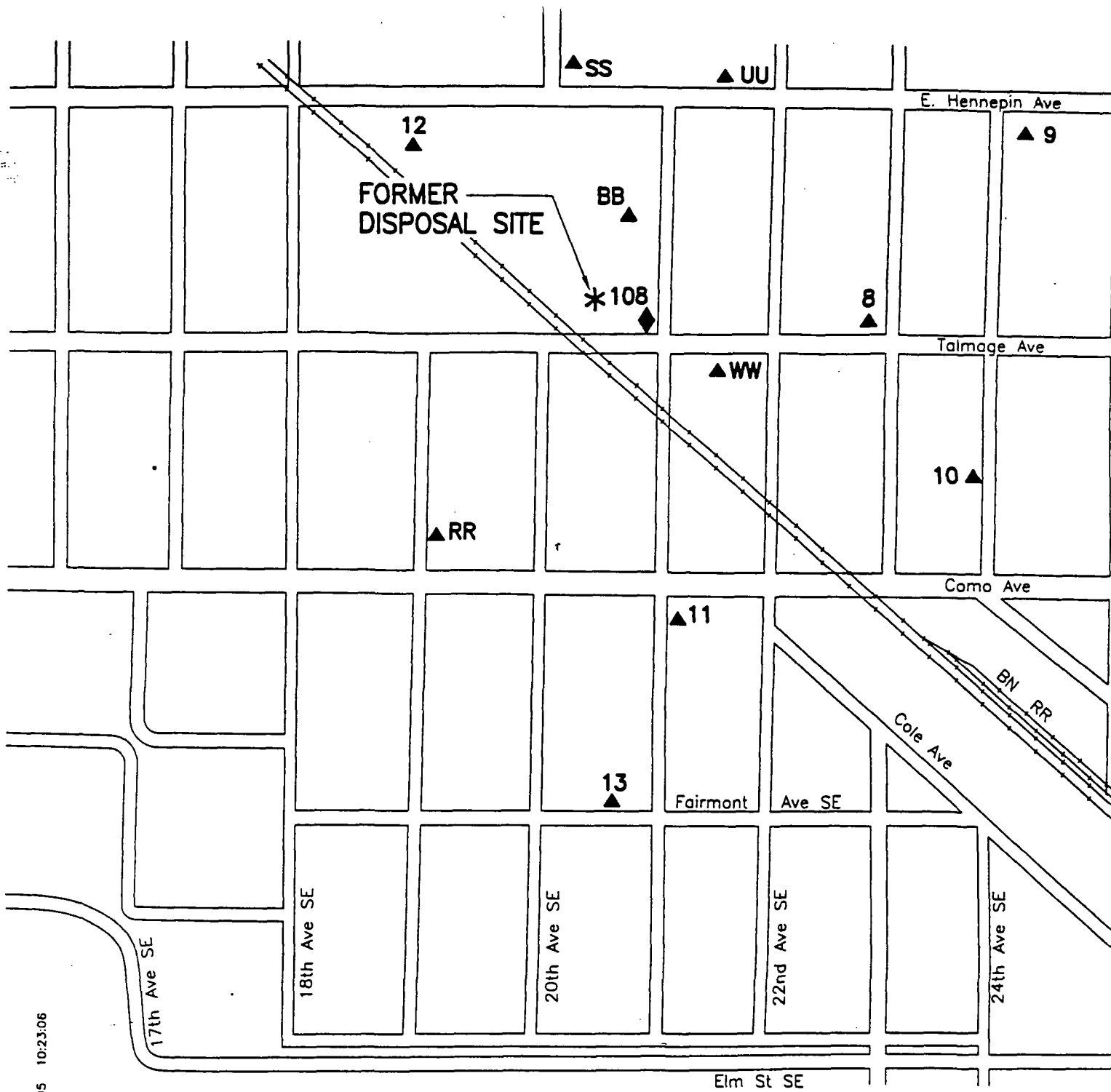


Figure 5
 GLACIAL DRIFT AQUIFER
 WATER TABLE ELEVATIONS
 August 13, 1996



- ▲ CARIMONA MEMBER MONITORING WELL
- ◆ FORMER CARIMONA MEMBER PUMP-OUT WELL

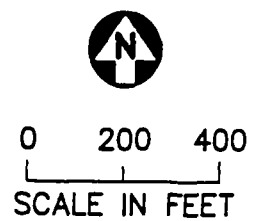
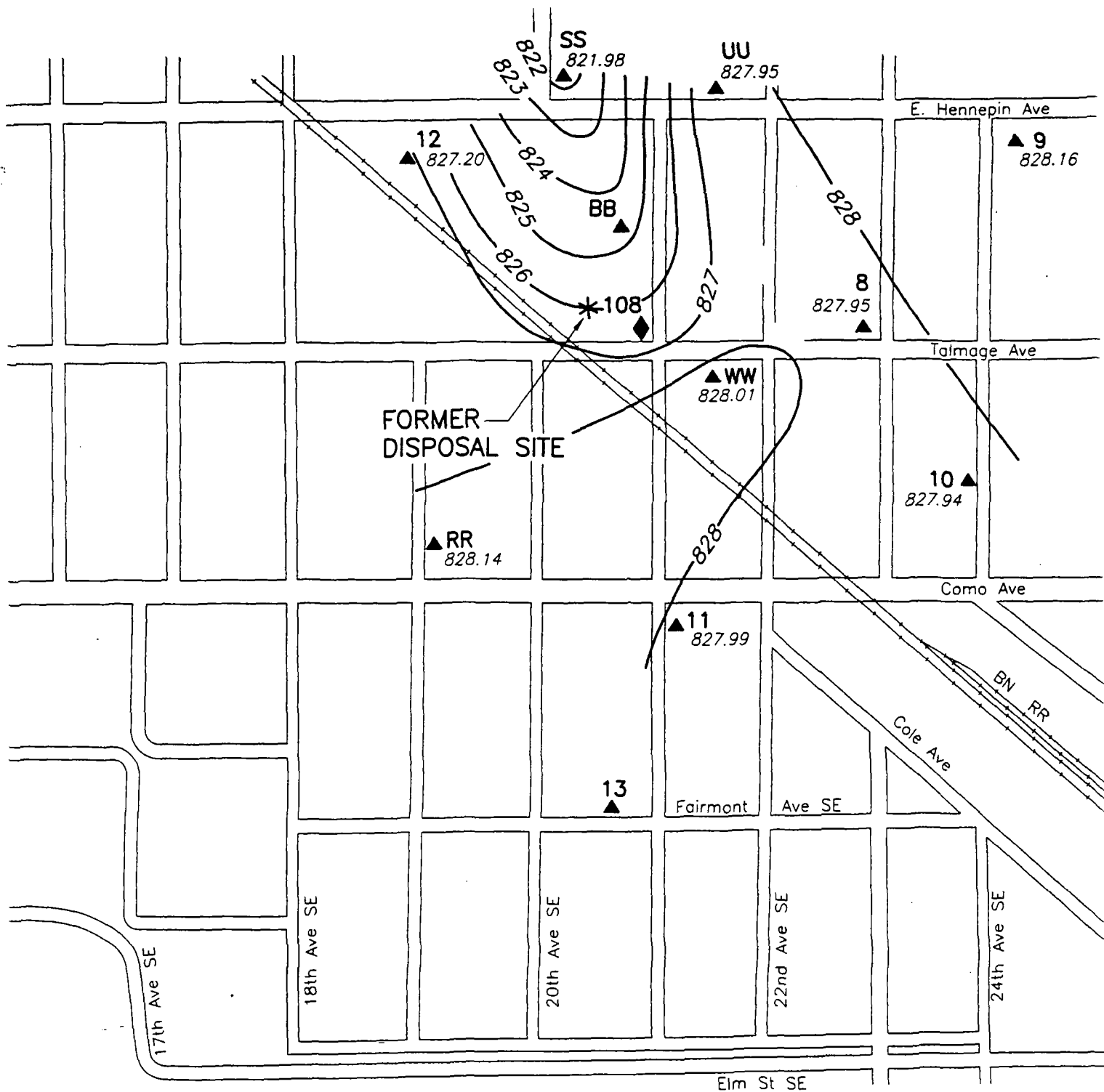


Figure 6
MONITORING WELL LOCATIONS
CARIMONA MEMBER

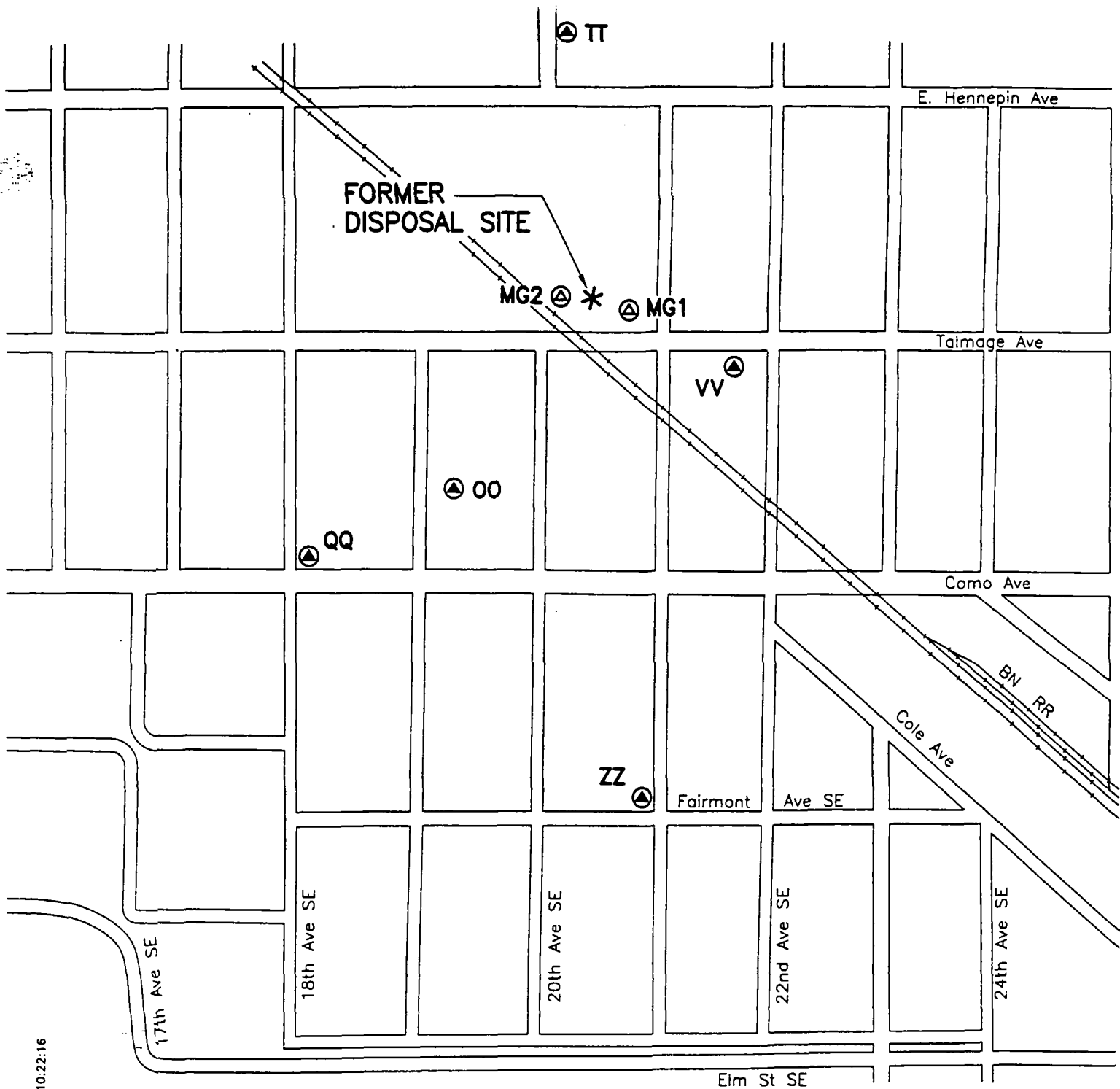


- ▲ CARIMONA MEMBER MONITORING WELL
- ◆ FORMER CARIMONA MEMBER PUMP-OUT WELL
- 824.14 CARIMONA POTENTIOMETRIC SURFACE ELEVATION (MSL)
- 828 — CARIMONA POTENTIOMETRIC SURFACE CONTOUR (MSL)



0 200 400
SCALE IN FEET

Figure 7
CARIMONA MEMBER
POTENTIOMETRIC SURFACE ELEVATIONS
August 13, 1996



- ▲ MAGNOLIA MEMBER MONITORING WELL
- ▲ MAGNOLIA MEMBER PUMP-OUT WELL

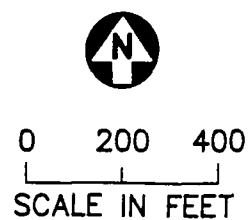


Figure 8

MONITORING WELL LOCATIONS
MAGNOLIA MEMBER

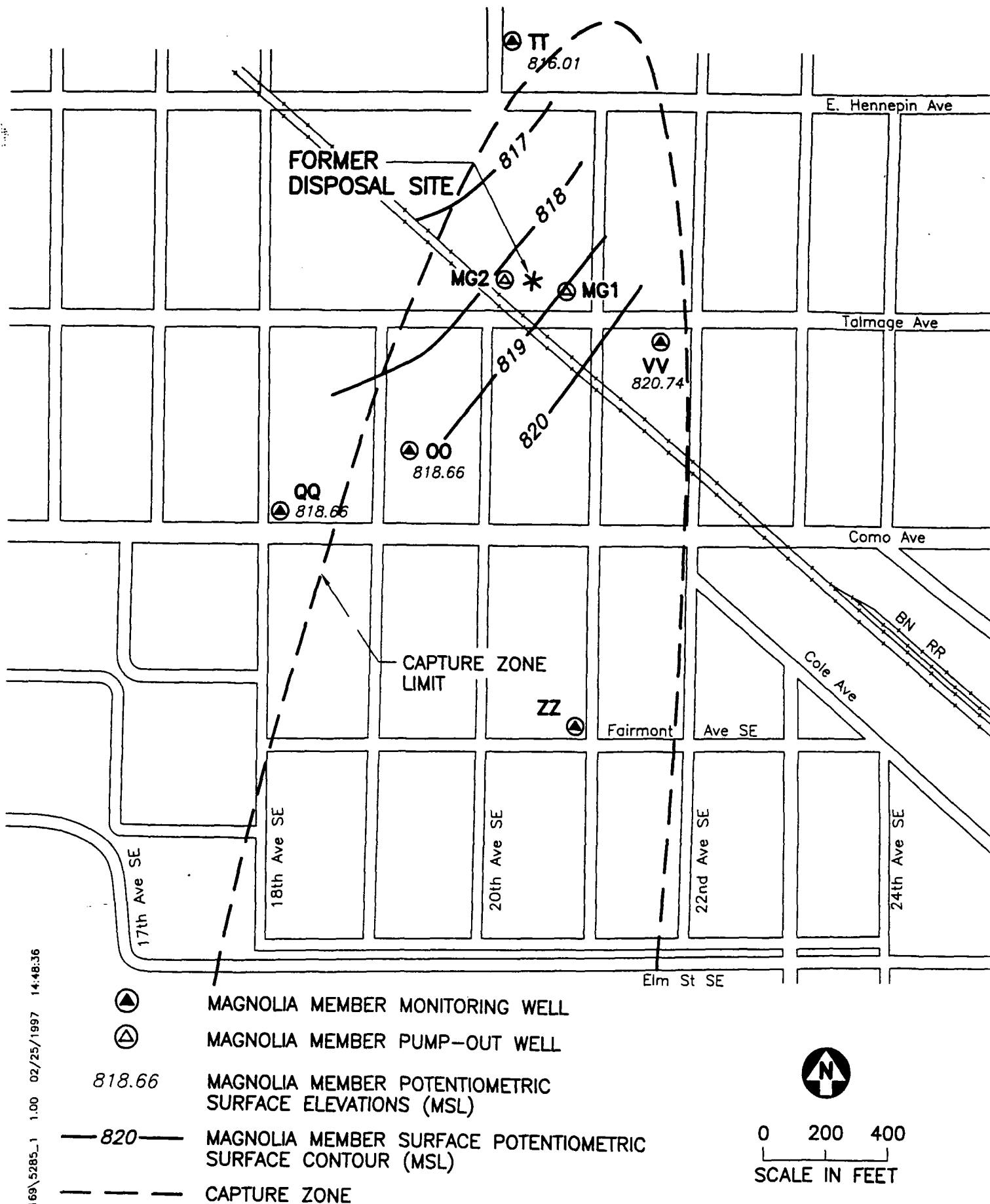
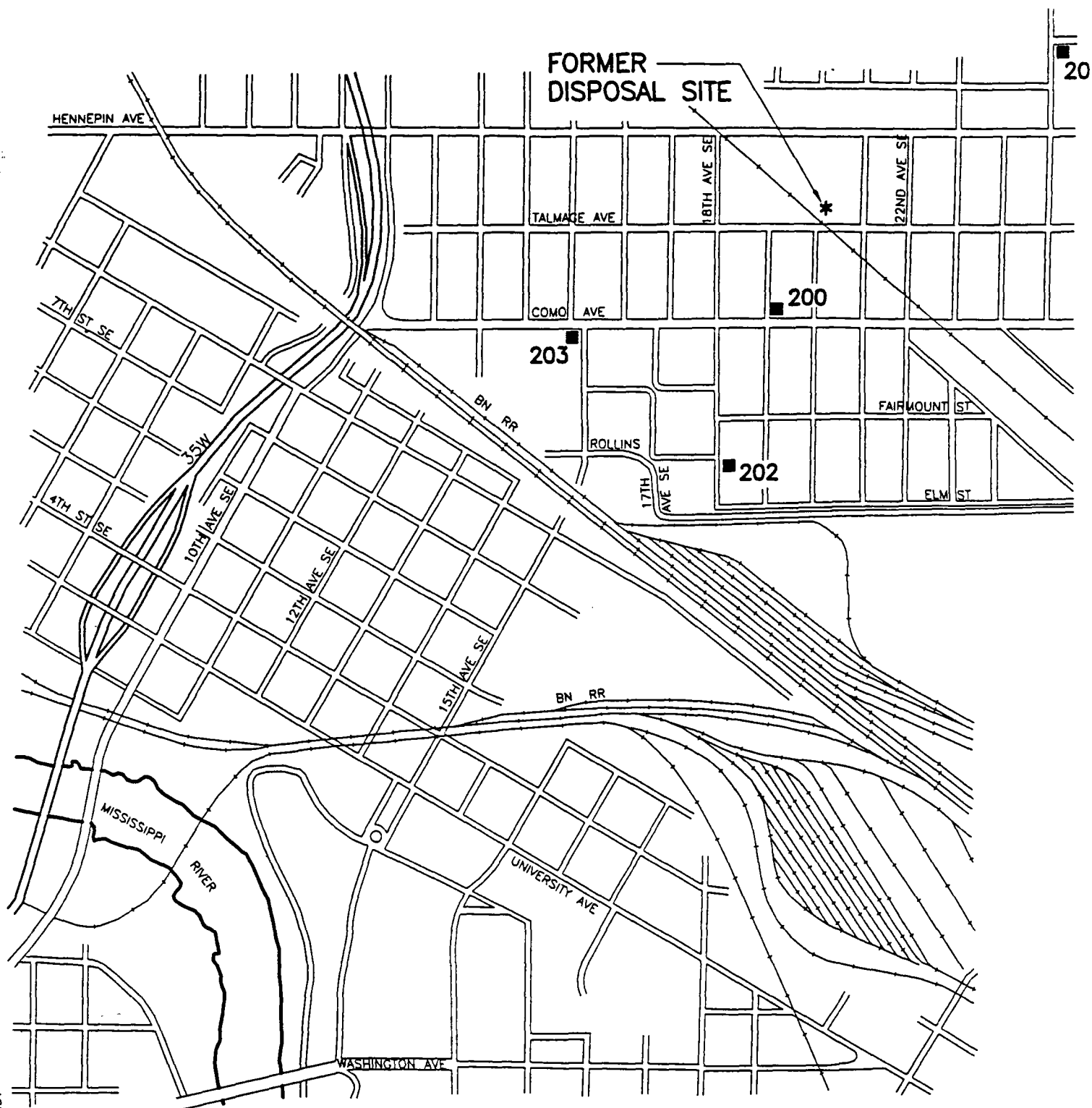


Figure 9

POTENTIOMETRIC SURFACE ELEVATIONS
MAGNOLIA MEMBER
August 13, 1996

\\2856_1 1.00 01/22/1996 21:32:51

JL



■ ST. PETER SANDSTONE MONITORING WELL



0 1000
SCALE IN FEET

Figure 10
MONITORING WELL LOCATIONS
ST. PETER SANDSTONE

JEM M:\CAD\2327169\5529_1 1.00 01/16/1997 14:03:07

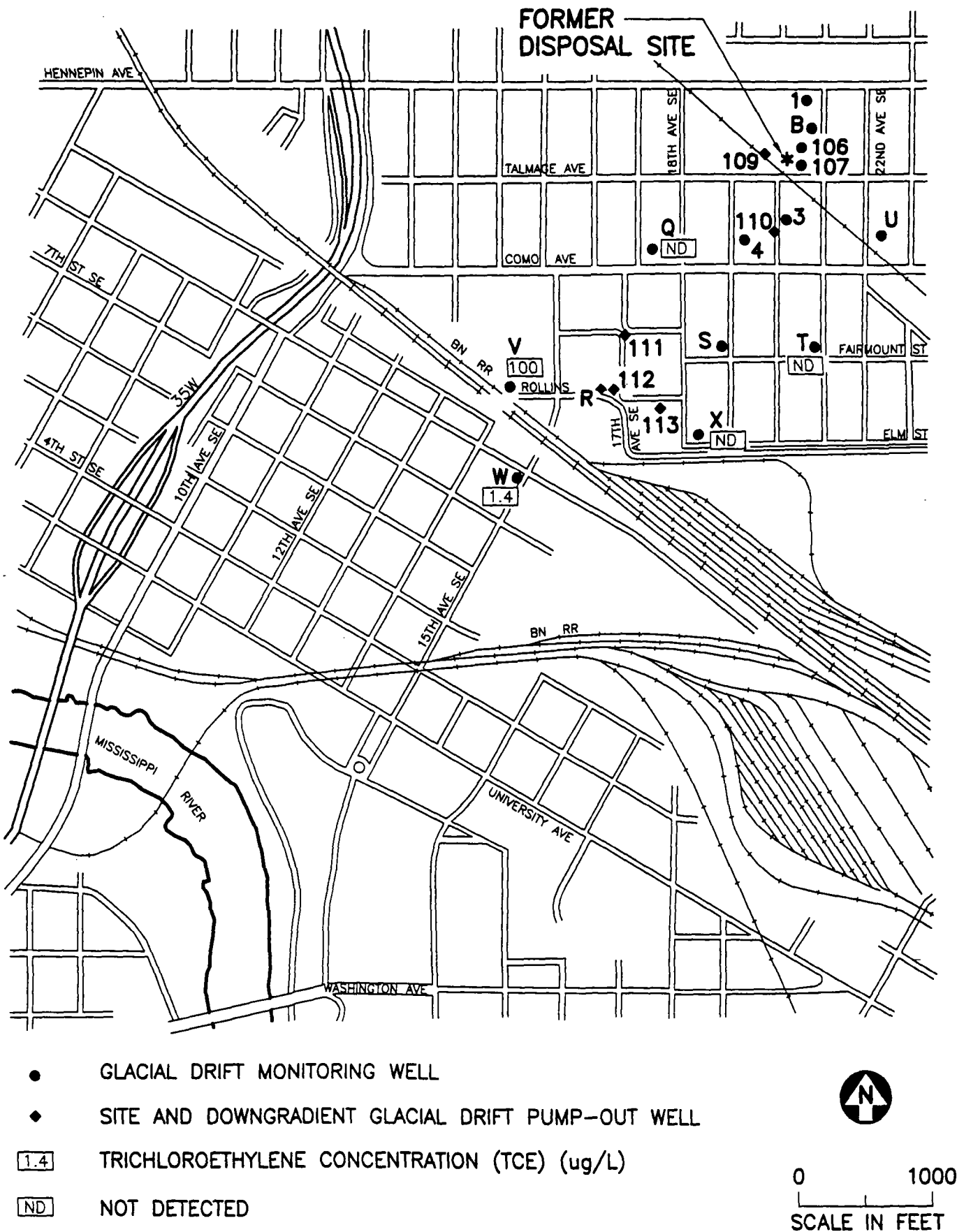


Figure 11
GLACIAL DRIFT
GROUNDWATER QUALITY (TCE)
August 1996

Trichloroethylene vs. Time

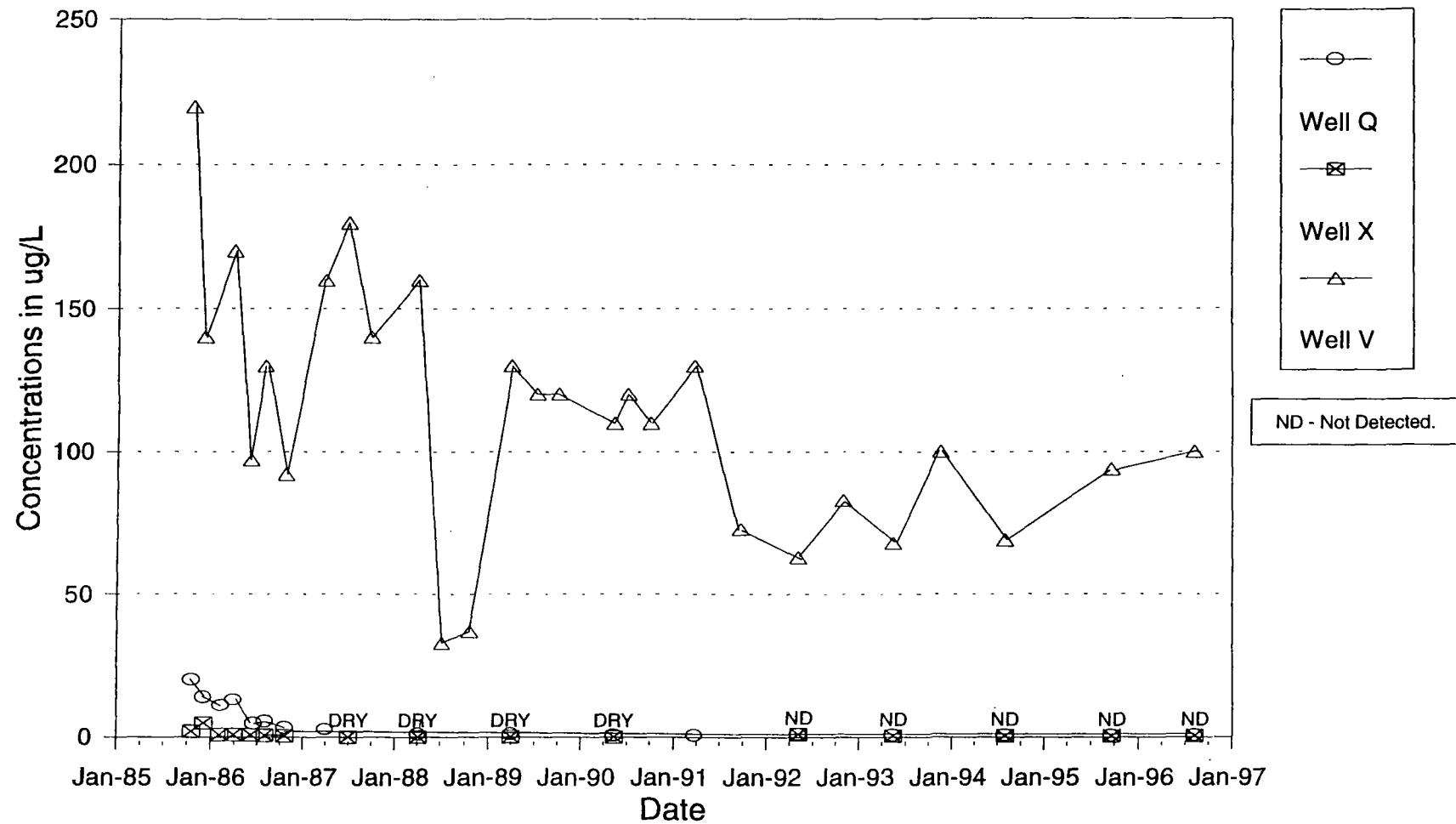
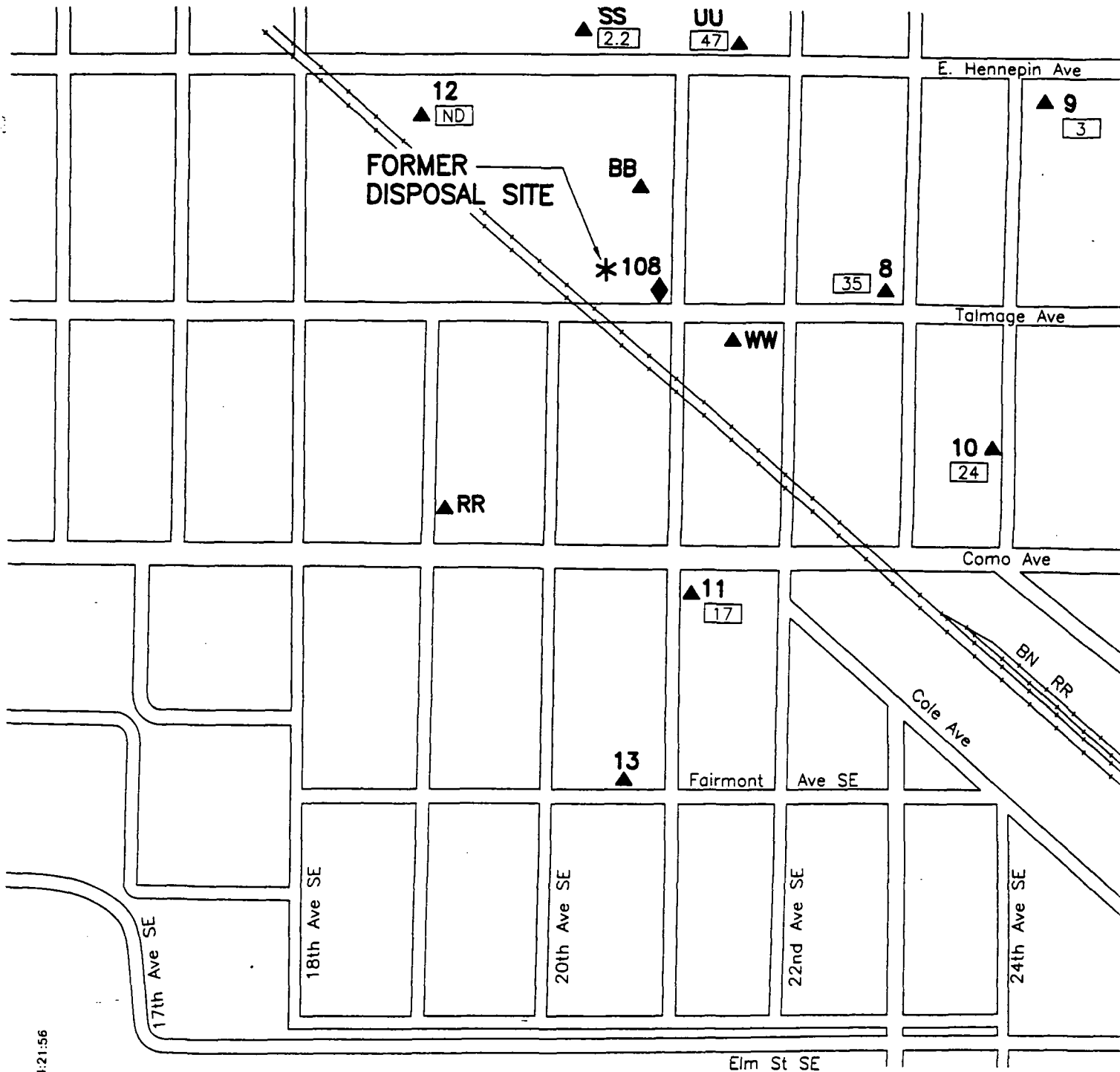


FIGURE 12
GLACIAL DRIFT WELLS
TCE CONCENTRATIONS
1985-1996



- ▲ CARIMONA MEMBER MONITORING WELL
- ◆ FORMER CARIMONA MEMBER PUMP-OUT WELL
- [35] TRICHLOROETHYLENE CONCENTRATION (TCE) (ug/L)
- [ND] NOT DETECTED

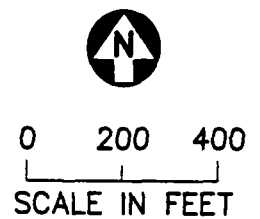


Figure 13
CARIMONA MEMBER
GROUNDWATER QUALITY (TCE)
AUGUST 1996

Trichloroethylene vs. Time

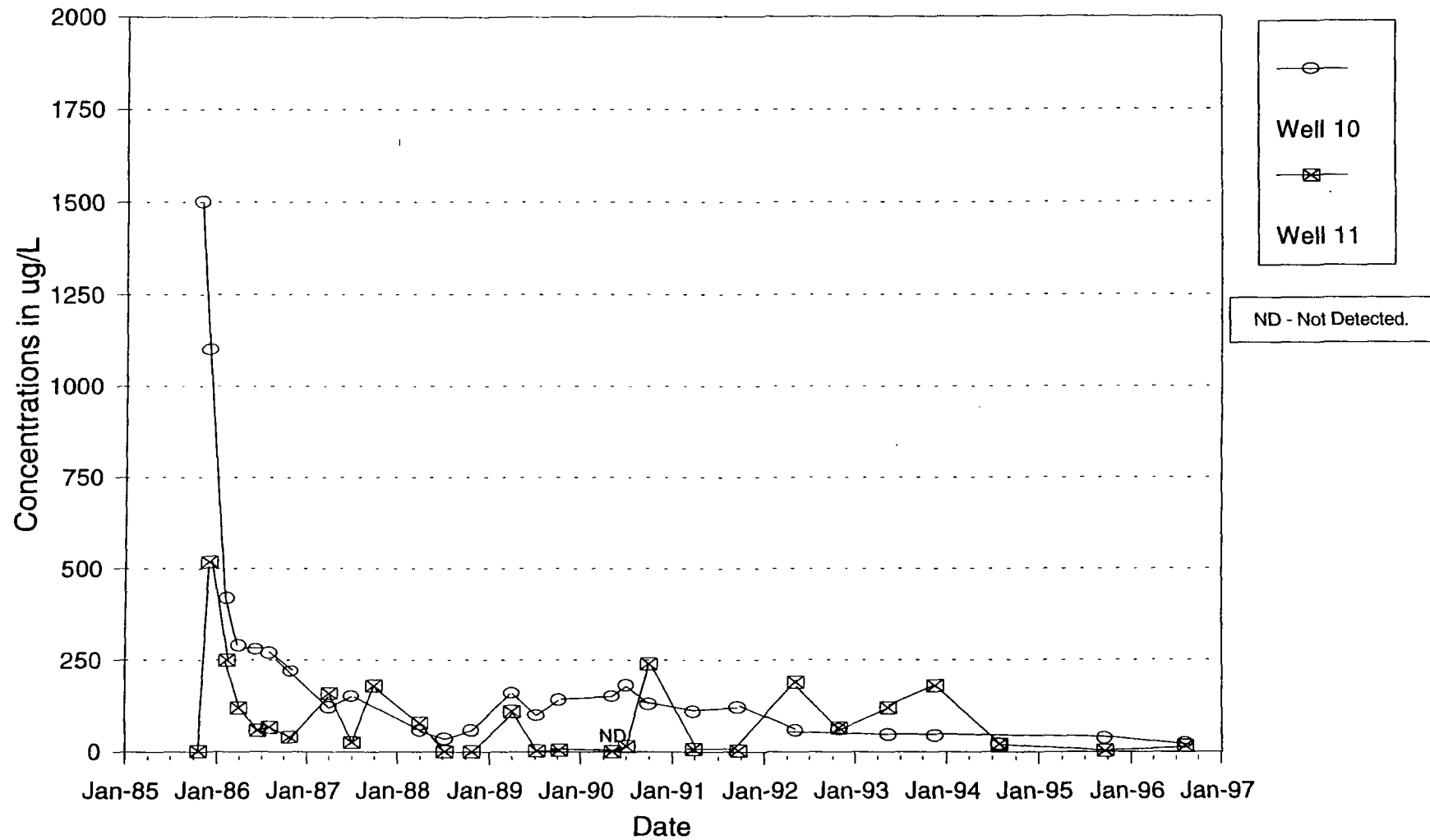
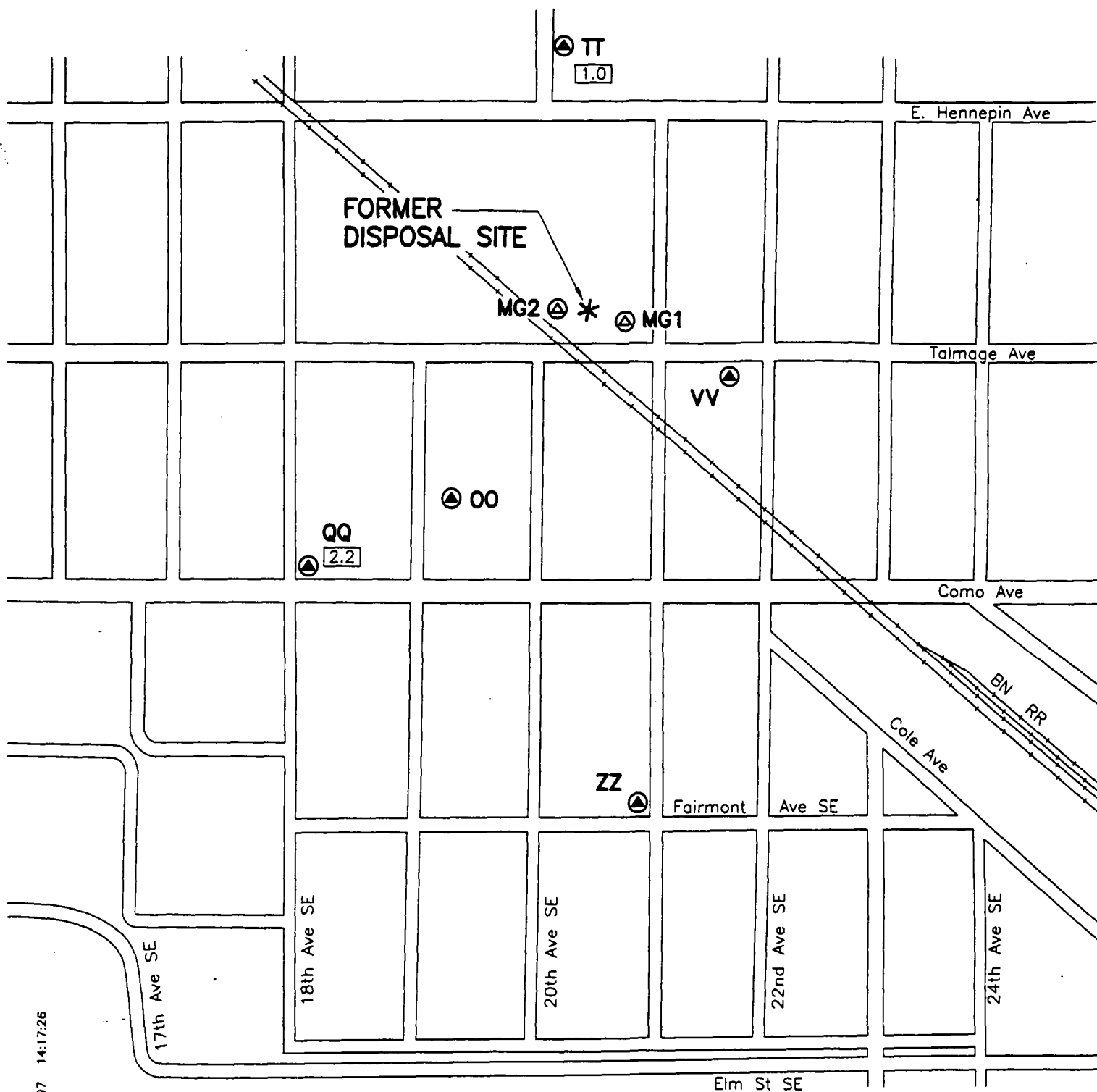


FIGURE 14
CARIMONA MEMBER WELLS
TCE CONCENTRATIONS
1985-1996



- ▲ MAGNOLIA MEMBER MONITORING WELL
- ⊙ MAGNOLIA MEMBER PUMP-OUT WELL
- 2.2 TRICHLOROETHYLENE CONCENTRATION (TCE) (ug/L)

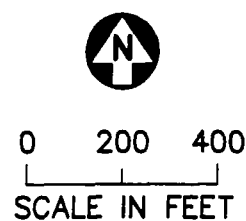


Figure 15

MAGNOLIA MEMBER
GROUNDWATER QUALITY (TCE)
August 1996

Trichloroethylene vs. Time

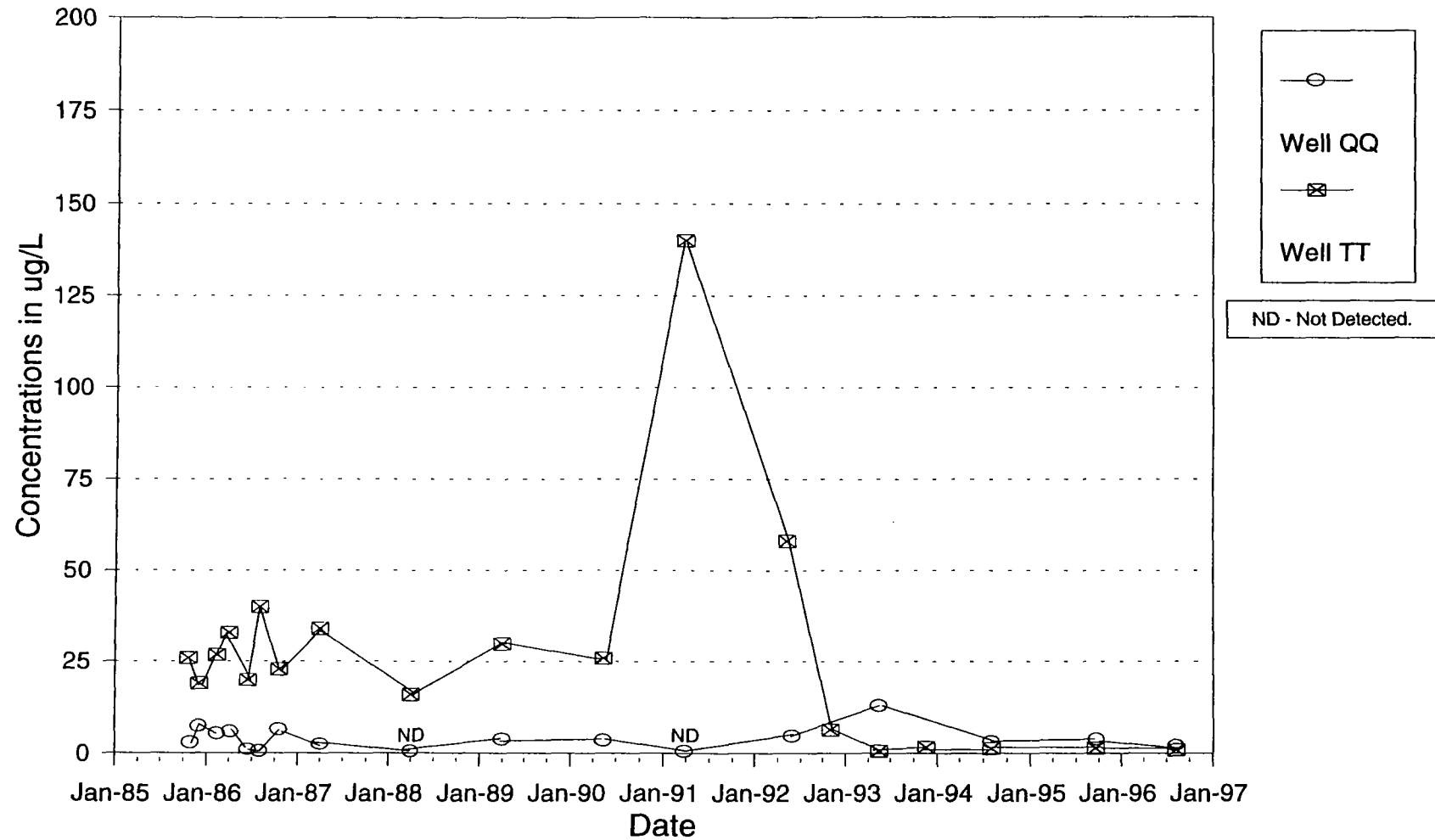


FIGURE 16
MAGNOLIA MEMBER WELLS
TCE CONCENTRATIONS
1985-1996



Figure 17
 ST PETER SANDSTONE
 GROUNDWATER QUALITY (TCE)
 August 1996

Trichloroethylene vs. Time

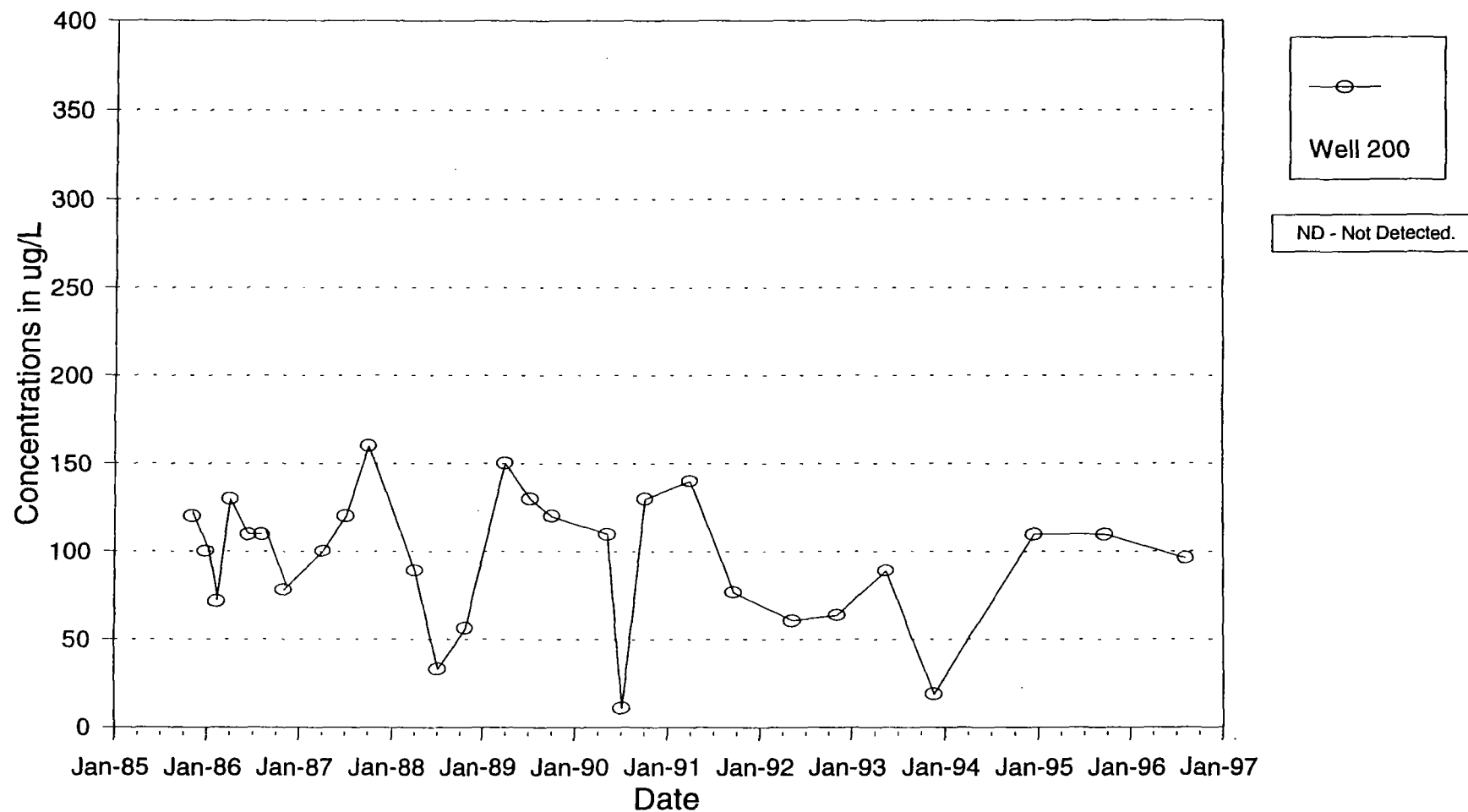


FIGURE 18
ST. PETER SANDSTONE WELLS
TCE CONCENTRATIONS
1985-1996

Trichloroethylene vs. Time

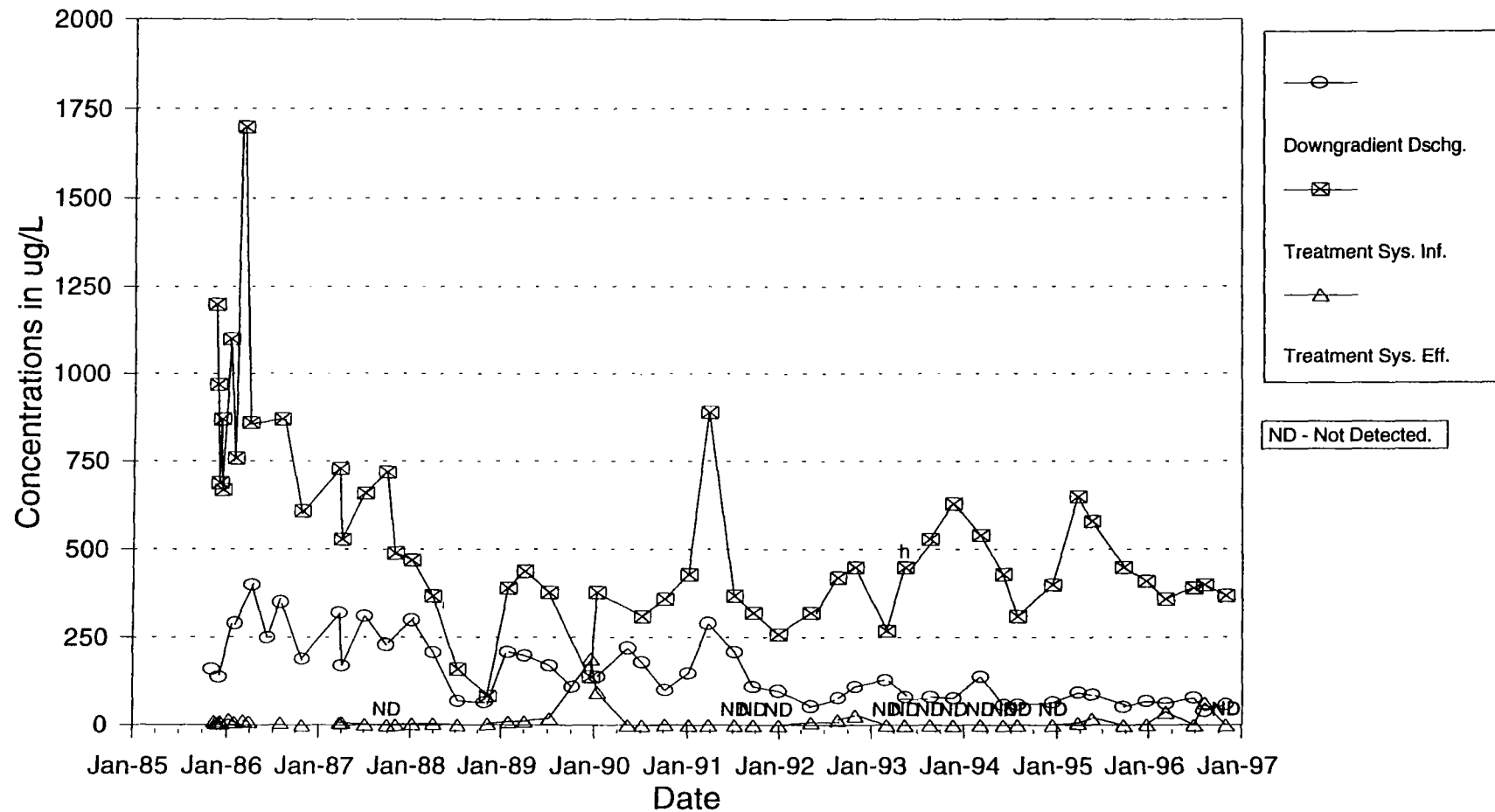


FIGURE 19
 DOWNGRAIDENT PUMP-OUT SYSTEM DISCHARGE
 (WELLS 111,112,113) AND GROUNDWATER TREATMENT
 SYSTEM INFLUENT/EFFLUENT (WELLS 108,109,110)*
 TCE CONCENTRATIONS
 1985-1996

* Well 108 removed from system, September 23, 1992

Trichloroethylene vs. Time

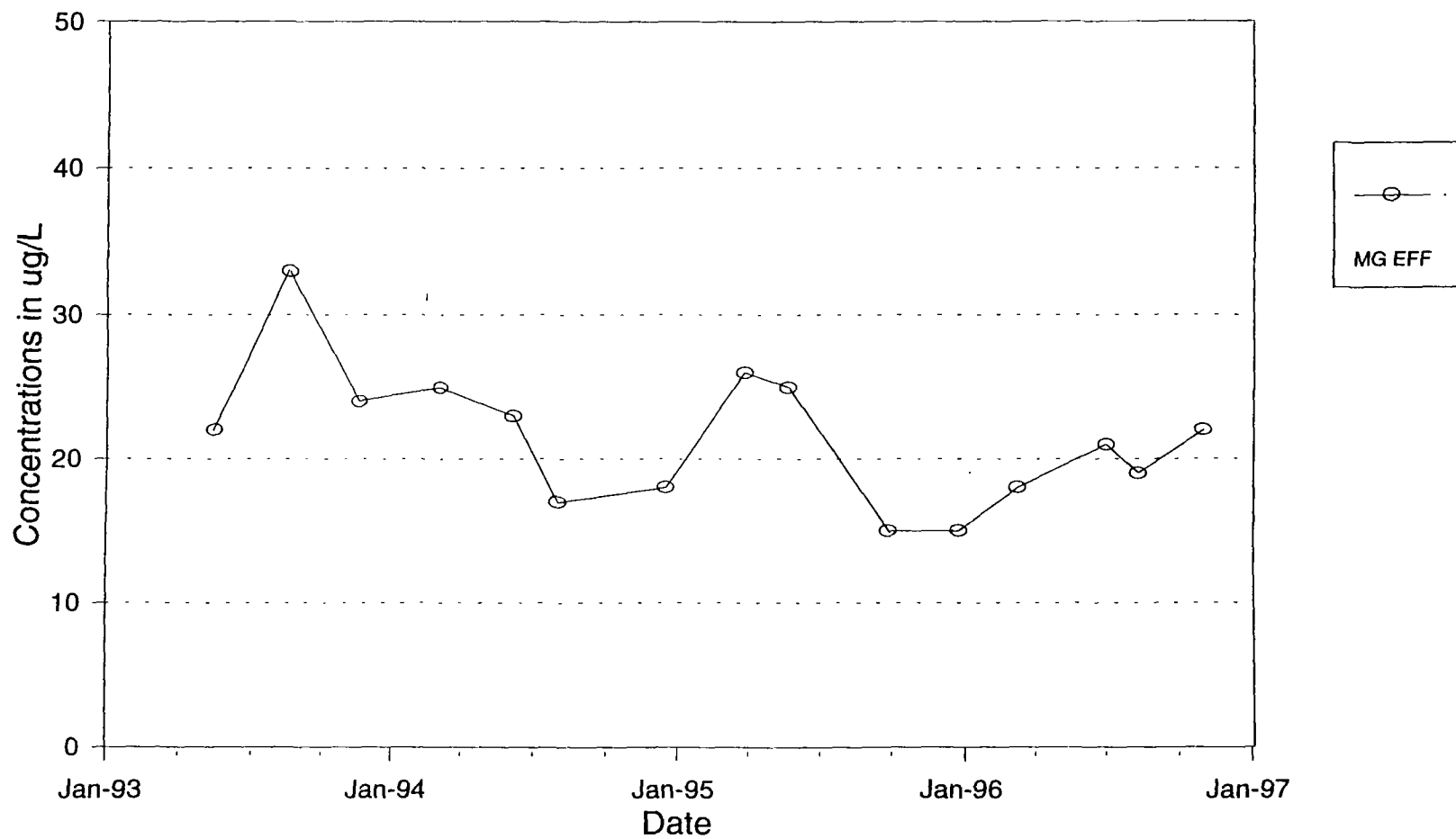


FIGURE 20
MAGNOLIA PUMP OUT WELLS (MG1 AND MG2)
TCE CONCENTRATIONS
1993-1996

Appendices

Appendix A

Quality Assurance/Quality Control Data

Appendix A

Quality Assurance/Quality Control

List of Tables

| | |
|-----------|---------------------------|
| Table A-1 | 1996 Blank Sample Data |
| Table A-2 | 1996 Blind Duplicate Data |

TABLE A-1

1996 BLANK SAMPLE DATA

(concentrations in ug/L)

| | LAB BLANKS | | | | | | | |
|-----------------------------|------------|----------|----------|----------|----------|----------|----------|----------|
| | 01/03/96 | 03/11/96 | 03/11/96 | 07/02/96 | 07/02/96 | 08/13/96 | 08/14/96 | 11/04/96 |
| 1,1-Dichloroethane | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethane | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethylene, cis | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethylene, trans | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,1,2,2-Tetrachloroethane | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Tetrachloroethylene | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,1,1-Trichloroethane | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Trichloroethylene | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benzene | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | -- | <0.5 |
| Toluene | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | -- | <0.5 |
| Xylenes | <0.50 | <0.50 | <0.50 | <0.5 | <0.5 | <0.5 | -- | <0.5 |

| | LAB BLANKS | | TRIP BLANKS | | | FIELD BLANKS | | |
|-----------------------------|------------|----------|-------------|----------|----------|--------------|----------|----------|
| | 11/04/96 | 11/04/96 | 03/11/96 | 08/13/96 | 11/04/96 | 07/02/96 | 08/14/96 | 11/04/96 |
| 1,1-Dichloroethane | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethane | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethylene, cis | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,2-Dichloroethylene, trans | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,1,2,2-Tetrachloroethane | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Tetrachloroethylene | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,1,1-Trichloroethane | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Trichloroethylene | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benzene | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | -- | <0.5 |
| Toluene | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | -- | <0.5 |
| Xylenes | <0.5 | <0.5 | <0.50 | <0.5 | <0.5 | <0.5 | -- | <0.5 |

.008

12/19/96

Appendix B

*Historical Water Elevation
and Water Quality Data*

Appendix B

Historical Water Elevation and Water Quality Data

List of Tables

| | |
|------------|--|
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TABLE B-1 (cont.)

HISTORICAL WATER ELEVATION DATA
GLACIAL DRIFT WELLS

(elevations in feet/MSL)

| | B | Q | R | S | T |
|-------|--------|--------|--------|--------|--------|
| DATE | ----- | ----- | ----- | ----- | ----- |
| 10/81 | 843.31 | -- | -- | -- | -- |
| 02/82 | 844.45 | -- | -- | -- | -- |
| 02/82 | 842.78 | -- | -- | -- | -- |
| 02/82 | 842.77 | -- | -- | -- | -- |
| 03/82 | 842.84 | -- | -- | -- | -- |
| 03/82 | 842.72 | -- | -- | -- | -- |
| 03/82 | 842.68 | -- | -- | -- | -- |
| 03/82 | 824.89 | -- | -- | -- | -- |
| 04/82 | 842.96 | -- | -- | -- | -- |
| 04/82 | 843.03 | -- | -- | -- | -- |
| 04/82 | 843.03 | -- | -- | -- | -- |
| 04/82 | 843.14 | -- | -- | -- | -- |
| 11/82 | 843.56 | -- | -- | -- | -- |
| 12/82 | 843.59 | -- | -- | -- | -- |
| 02/83 | 843.30 | -- | -- | -- | -- |
| 04/83 | 844.13 | -- | -- | -- | -- |
| 06/83 | 844.37 | -- | -- | -- | -- |
| 09/83 | 844.14 | -- | -- | -- | -- |
| 11/83 | 844.01 | -- | -- | -- | -- |
| 01/84 | 843.93 | -- | -- | -- | -- |
| 02/84 | -- | 830.49 | 827.64 | 829.85 | 832.38 |
| 03/84 | 844.13 | 832.08 | 829.15 | 831.21 | 833.89 |
| 10/85 | 843.89 | 831.58 | 829.00 | 832.00 | 833.96 |
| 12/85 | 843.86 | 831.22 | 828.73 | 830.95 | 833.37 |
| 07/87 | -- | -- | DRY | 824.91 | 831.74 |
| 10/87 | -- | -- | -- | 826.36 | 832.72 |
| 04/88 | 843.38 | 826.86 | -- | 824.94 | 831.80 |
| 07/88 | -- | 826.46 | DRY | 824.63 | 832.44 |
| 10/88 | -- | 826.77 | DRY | 824.92 | 833.03 |
| 04/89 | 843.17 | 827.45 | DRY | 825.23 | 832.25 |
| 07/89 | -- | 827.95 | DRY | 825.55 | 832.41 |
| 10/89 | -- | 828.26 | DRY | 826.45 | 832.23 |
| 05/90 | -- | 827.08 | DRY | 825.92 | 832.14 |
| 07/90 | 844.33 | 828.50 | DRY | 827.38 | 832.89 |
| 10/90 | -- | 828.28 | DRY | 827.43 | 832.62 |
| 04/91 | 842.76 | 827.43 | -- | 825.96 | 832.14 |
| 09/91 | 843.46 | 828.90 | -- | 828.42 | 833.06 |
| 05/92 | 843.40 | 828.80 | -- | 828.55 | 833.05 |
| 11/92 | 843.43 | 828.88 | -- | 828.09 | 832.61 |
| 05/93 | 843.47 | 828.18 | -- | 827.04 | 832.56 |
| 11/93 | 843.64 | 828.42 | DRY | 828.07 | 833.74 |
| 08/94 | -- | 827.96 | -- | -- | 832.78 |
| 09/95 | -- | 828.27 | -- | -- | 833.03 |
| 08/96 | -- | 828.23 | -- | -- | 833.30 |

-- Not measured.

2,.012

02/12/97

TABLE B-1 (cont.)

HISTORICAL WATER ELEVATION DATA
GLACIAL DRIFT WELLS

(elevations in feet/MSL)

| DATE | U | V | W | X |
|----------|---------------|--------|--------|--------|
| | ----- | ----- | ----- | ----- |
| 02/84 | 837.07 | -- | -- | -- |
| 03/84 | 838.82 | 818.16 | 818.25 | 829.00 |
| 10/85 | 838.11 | 818.61 | 818.49 | 831.59 |
| 12/85 | 837.30 | 817.99 | 817.96 | 829.02 |
| 07/87 | -- | 815.3 | 814.4 | DRY |
| 10/87 | -- | 815.93 | 816.10 | -- |
| 04/88 | 835.58 | 814.51 | 814.59 | DRY |
| 07/88 | -- | 814.03 | 814.03 | DRY |
| 10/88 | -- | 814.44 | 814.54 | DRY |
| 04/89 | 835.72 | 814.19 | 814.34 | DRY |
| 07/89 | -- | 814.77 | 814.86 | 822.05 |
| 10/89 | -- | 815.16 | 815.26 | DRY |
| 05/90 | 835.86 | 814.64 | 814.38 | 822.07 |
| 07/90 | -- | 816.65 | 816.75 | 822.95 |
| 10/90 | -- | 816.70 | 816.80 | 823.08 |
| 04/91 | 835.35 | 815.60 | 815.69 | DRY |
| 09/91 | 836.54 | 818.19 | 818.18 | 824.25 |
| 05/92 | 836.50 | 817.77 | 817.81 | 823.41 |
| 11/92 | 836.21 | 817.27 | 817.44 | 824.05 |
| 05/93 | 836.22 | 816.13 | 816.29 | 822.55 |
| 11/93 | 836.42 | 817.17 | 817.23 | 823.81 |
| 08/94 | -- | 816.53 | 816.66 | 822.63 |
| 09/95 | -- | 817.18 | 817.29 | 823.02 |
| 08/96 | -- | 815.94 | 816.10 | 822.86 |
| ----- | | | | |
| -- | Not measured. | | | |
| 2., 012 | | | | |
| 02/12/97 | | | | |

TABLE B-2

HISTORICAL WATER ELEVATION DATA
CARIMONA MEMBER WELLS

(elevations in feet/MSL)

| DATE | 8 | 9 | 10 | 11 | 12 | 13 |
|-------|--------|--------|--------|--------|--------|--------|
| 11/82 | 828.91 | -- | -- | -- | -- | -- |
| 04/83 | 836.76 | -- | -- | -- | -- | -- |
| 06/83 | 835.81 | -- | -- | -- | -- | -- |
| 09/83 | 838.68 | -- | -- | -- | -- | -- |
| 09/83 | 835.51 | -- | -- | -- | -- | -- |
| 03/84 | 830.15 | 830.15 | 830.21 | 830.18 | 831.43 | 830.21 |
| 10/85 | 830.58 | 830.61 | 830.62 | 830.65 | 832.11 | 830.01 |
| 12/85 | 829.71 | 830.05 | 829.86 | 829.73 | 831.50 | 829.25 |
| 07/87 | 827.10 | 827.3 | 827.28 | 827.26 | 827.83 | 826.49 |
| 10/87 | 828.79 | 828.69 | 828.72 | 828.79 | 828.63 | 828.14 |
| 04/88 | 827.71 | 827.85 | 827.86 | 827.74 | 828.12 | 827.05 |
| 07/88 | 824.91 | 825.12 | 825.07 | 824.97 | 825.40 | 824.36 |
| 10/88 | 826.83 | 826.98 | 826.99 | 826.86 | 826.61 | 826.17 |
| 04/89 | 827.13 | 827.37 | 827.37 | 827.16 | 827.20 | 826.63 |
| 07/89 | 825.41 | 825.64 | 825.59 | 825.43 | 826.18 | 824.74 |
| 10/89 | 827.32 | 827.52 | 827.82 | 827.37 | 826.70 | 826.78 |
| 05/90 | 827.06 | 827.38 | 827.26 | 827.31 | 827.52 | 826.65 |
| 07/90 | 827.92 | 828.18 | 828.10 | 827.84 | 826.73 | 827.20 |
| 10/90 | 828.38 | 828.59 | 828.58 | 828.41 | 828.23 | 827.78 |
| 04/91 | 828.63 | 828.84 | 828.83 | 828.70 | 828.92 | 828.06 |
| 09/91 | 829.19 | 829.40 | 829.40 | 829.15 | 828.46 | 828.55 |
| 05/92 | 828.87 | 829.02 | 829.01 | 828.93 | 829.26 | 828.29 |
| 11/92 | 828.81 | 828.98 | 829.03 | 828.85 | 827.60 | 828.23 |
| 05/93 | 827.37 | 827.38 | 827.58 | 827.39 | 826.95 | 826.72 |
| 11/93 | 829.26 | 829.34 | 829.45 | 829.56 | 828.36 | 828.89 |
| 08/94 | 827.58 | 827.59 | 827.67 | 827.85 | 826.94 | -- |
| 09/95 | 829.76 | 829.98 | 829.96 | 829.78 | 828.18 | -- |
| 08/96 | 827.95 | 828.16 | 827.94 | 827.99 | 827.20 | -- |

-- Not measured.

2,.011

TABLE B-2 (cont.)

HISTORICAL WATER ELEVATION DATA
CARIMONA MEMBER WELLS

(elevations in feet/MSL)

| DATE | 108 (1) | BB | RR | SS | UU | WW |
|-------|---------|--------|--------|--------|--------|--------|
| 10/81 | -- | 828.09 | -- | -- | -- | -- |
| 11/81 | -- | 827.85 | -- | -- | -- | -- |
| 02/82 | -- | 829.87 | -- | -- | -- | -- |
| 02/82 | -- | 827.85 | -- | -- | -- | -- |
| 02/82 | -- | 827.77 | -- | -- | -- | -- |
| 03/82 | -- | 827.85 | -- | -- | -- | -- |
| 03/82 | -- | 828.61 | -- | -- | -- | -- |
| 03/82 | -- | 827.81 | 827.73 | -- | -- | -- |
| 03/82 | -- | 827.76 | 827.73 | -- | -- | -- |
| 04/82 | -- | 827.89 | 827.76 | -- | -- | -- |
| 04/82 | -- | 827.82 | -- | -- | -- | -- |
| 04/82 | -- | 827.82 | 827.57 | -- | -- | -- |
| 04/82 | -- | 828.08 | 828.17 | -- | -- | -- |
| 11/82 | -- | 829.07 | 829.12 | 835.43 | 828.85 | 828.91 |
| 12/82 | -- | 829.18 | 829.22 | 835.67 | 831.10 | 829.08 |
| 02/83 | -- | 828.89 | 828.98 | 834.07 | 828.98 | 828.76 |
| 02/83 | -- | -- | -- | 834.25 | -- | -- |
| 04/83 | -- | 829.69 | 829.72 | 834.13 | 829.54 | 829.48 |
| 06/83 | -- | 829.96 | 829.97 | 834.29 | 829.86 | 829.77 |
| 09/83 | -- | 829.66 | 829.53 | 823.15 | 829.55 | 829.45 |
| 11/83 | 830.12 | 830.15 | 830.08 | 833.90 | 830.24 | 829.95 |
| 01/84 | -- | 829.84 | -- | 833.55 | 829.80 | 829.69 |
| 01/84 | 830.65 | 830.12 | 828.99 | 833.50 | 830.02 | 829.94 |
| 03/84 | 830.92 | 830.25 | 830.16 | 832.34 | 830.18 | 830.08 |
| 10/85 | 830.77 | 830.26 | 830.19 | 831.76 | 830.63 | 830.60 |
| 12/85 | 812.90 | 829.76 | 829.90 | 830.59 | 829.88 | 829.79 |
| 07/87 | 805.9 | -- | 827.11 | 826.18 | -- | -- |
| 10/87 | 806.06 | -- | 828.82 | 827.27 | -- | -- |
| 04/88 | 804.57 | 827.81 | 827.85 | 826.22 | 827.72 | 827.71 |
| 07/88 | 804.45 | -- | 825.11 | 824.05 | -- | -- |
| 10/88 | 804.49 | -- | 826.95 | 825.37 | -- | -- |
| 04/89 | 807.81 | 827.34 | 827.35 | 825.54 | 827.31 | 827.31 |
| 07/89 | 804.51 | -- | 825.65 | 823.62 | -- | -- |
| 10/89 | 827.49 | -- | 827.57 | 825.12 | -- | -- |
| 05/90 | -- | -- | 827.41 | 824.77 | 827.28 | 827.27 |
| 07/90 | 804.54 | 828.01 | 827.98 | 827.05 | -- | -- |
| 10/90 | 804.64 | -- | 828.48 | 826.74 | -- | -- |
| 04/91 | 807.87 | 828.75 | 828.76 | 826.42 | 828.69 | 828.66 |
| 09/91 | 804.55 | 829.25 | 829.41 | 826.95 | 829.23 | 831.23 |
| 01/92 | 830.22 | -- | -- | -- | -- | -- |
| 05/92 | 805.36 | 828.93 | 829.08 | 826.42 | 828.92 | 828.89 |
| 11/92 | 829.22 | 828.65 | 829.01 | 824.50 | 828.93 | 828.86 |
| 05/93 | -- | 827.16 | 827.48 | 822.62 | 827.40 | 827.04 |
| 11/93 | 829.53 | 829.29 | 829.63 | 823.68 | 829.50 | 829.50 |
| 08/94 | -- | -- | -- | 822.79 | 827.90 | -- |
| 09/95 | -- | -- | 829.95 | 824.46 | 829.83 | 829.79 |
| 08/96 | -- | -- | 828.14 | 821.98 | 827.95 | 828.01 |

(1) Carimona pump-out well.
-- Not measured.

TABLE B-3

HISTORICAL WATER ELEVATION DATA MAGNOLIA MEMBER WELLS

(elevations in feet/MSL)

| DATE | OO ----- | QQ ----- | TT ----- | VV ----- | ZZ ----- |
|-------|-------------|-------------|-------------|-------------|-------------|
| 03/82 | 823.60 | 823.25 | -- | -- | -- |
| 03/82 | 823.60 | 823.34 | -- | -- | -- |
| 03/82 | 823.48 | 823.29 | -- | -- | -- |
| 04/82 | 823.64 | 823.37 | -- | -- | -- |
| 04/82 | 823.72 | 823.42 | -- | -- | -- |
| 04/82 | 823.99 | 823.75 | -- | -- | -- |
| 11/82 | 824.96 | 824.61 | 822.41 | 825.57 | -- |
| 12/82 | 824.79 | 824.41 | 822.59 | 825.76 | -- |
| 02/83 | 825.51 | 823.57 | 822.34 | 825.50 | -- |
| 02/83 | -- | -- | 822.62 | -- | -- |
| 04/83 | 825.29 | 823.00 | 822.90 | 826.32 | -- |
| 06/83 | 825.80 | 825.61 | 823.60 | 826.43 | -- |
| 09/83 | 824.71 | 825.20 | 829.55 | 826.18 | -- |
| 11/83 | 825.69 | 825.44 | 823.44 | 826.52 | -- |
| 01/84 | 825.46 | -- | 823.26 | 826.32 | -- |
| 03/84 | 825.78 | 825.61 | 823.54 | 826.64 | 830.2 |
| 02/85 | -- | -- | 822.62 | -- | -- |
| 10/85 | 825.76 | 825.46 | 823.26 | 826.99 | 830.67 |
| 12/85 | 825.57 | 825.39 | 822.74 | 826.24 | 830.65 |
| 02/86 | 824.74 | 824.49 | 822.10 | 825.60 | 830.05 |
| 04/86 | 824.75 | 824.52 | 822.10 | 825.60 | 829.65 |
| 06/86 | 824.89 | 824.68 | 822.31 | 825.66 | 828.31 |
| 08/86 | 824.86 | 824.71 | 822.32 | 825.65 | 829.44 |
| 10/86 | 825.49 | 825.24 | 822.90 | 826.33 | 830.45 |
| 04/87 | 823.87 | 823.66 | 821.46 | 824.83 | 829.25 |
| 07/87 | 822.85 | 822.53 | 820.42 | 823.42 | 827.93 |
| 10/87 | 824.24 | 823.96 | 821.77 | 824.99 | 829.98 |
| 04/88 | 823.31 | 823.03 | 820.91 | 824.14 | 828.44 |
| 07/88 | 821.14 | 820.82 | 818.88 | 821.73 | 825.73 |
| 10/88 | 822.46 | 822.11 | 820.13 | 823.34 | 827.57 |
| 04/89 | 822.82 | 822.47 | 820.46 | 823.75 | 828.72 |
| 07/89 | 821.66 | 821.32 | 819.38 | 822.36 | 826.05 |
| 10/89 | 823.07 | 822.70 | 820.69 | 823.98 | 828.20 |
| 05/90 | 822.79 | 822.51 | 820.42 | 823.65 | 828.04 |
| 07/90 | 823.67 | 823.36 | 821.35 | 824.57 | 828.65 |
| 10/90 | 823.99 | 823.73 | 821.56 | 824.88 | 829.16 |
| 04/91 | 824.52 | 824.25 | 821.75 | 825.46 | 829.44 |
| 09/91 | 825.50 | 825.19 | 823.05 | 826.28 | 829.94 |
| 05/92 | 825.10 | 824.83 | 822.63 | 825.87 | 829.66 |
| 11/92 | 820.27 | 820.33 | 817.29 | 822.01 | 829.61 |
| 05/93 | 820.42 | 818.46 | 815.64 | 820.33 | 828.12 |
| 11/93 | 820.28 | 820.31 | 817.42 | 822.23 | 830.26 |
| 08/94 | -- | 818.90 | 816.30 | -- | -- |
| 09/95 | 820.19 | 820.23 | 817.47 | 822.25 | -- |
| 08/96 | 818.66 | 818.66 | 816.01 | 820.74 | -- |

(1) Magnolia Pump-out well

-- Not measured.

2,.010

TABLE B-4

HISTORICAL WATER ELEVATION DATA
ST. PETER SANDSTONE WELLS

(elevations in feet/MSL)

| DATE | 200 | 201 | 202 | 203 |
|-------|--------|--------|--------|--------|
| | ----- | ----- | ----- | ----- |
| 10/85 | -- | 779.64 | 751.98 | 752.05 |
| 12/85 | 758.68 | 780.24 | 752.60 | 757.58 |
| 07/87 | 760.63 | 777.82 | 753.86 | 753.43 |
| 10/87 | 760.47 | 779.35 | 753.28 | 753.42 |
| 04/88 | 761.89 | 780.40 | 753.36 | 753.37 |
| 07/88 | 758.57 | 773.59 | 752.28 | 752.10 |
| 10/88 | 760.78 | 778.42 | 752.53 | 752.43 |
| 04/89 | 762.22 | 779.61 | 753.67 | 753.57 |
| 07/89 | 758.96 | 775.98 | 752.77 | 752.37 |
| 10/89 | 760.36 | 777.25 | 752.70 | 752.43 |
| 05/90 | 761.79 | 778.59 | 753.72 | 753.29 |
| 07/90 | 759.54 | 776.15 | 753.16 | 752.61 |
| 10/90 | 759.90 | 776.67 | 752.44 | 751.93 |
| 04/91 | 761.75 | 778.01 | 753.50 | 752.94 |
| 09/91 | 761.38 | 778.26 | 753.38 | 752.96 |
| 05/92 | 762.57 | 778.37 | 754.73 | 754.01 |
| 11/92 | 763.44 | 780.11 | 754.93 | 754.23 |
| 05/93 | 763.12 | 778.52 | 754.94 | 754.05 |
| 11/93 | 764.00 | 780.11 | 754.86 | 753.79 |
| 08/94 | 760.90 | -- | -- | -- |
| 12/94 | 764.19 | -- | -- | -- |
| 09/95 | 763.78 | -- | -- | -- |
| 08/96 | 762.45 | -- | -- | -- |

-- Not measured.

2,.013

TABLE B-5

HISTORICAL WATER ELEVATION DATA
GLACIAL DRIFT PUMP-OUT WELLS

(elevations in feet/MSL)

| DATE | 109 (1) | 110 (1) | 111 (2) | 112 (2) | 113 (2) |
|-------|---------|---------|---------|---------|---------|
| 10/85 | 837.21 | 835.62 | 829.25 | 829.10 | 829.20 |
| 12/85 | 828.19 | 829.11 | 828.83 | 828.59 | 828.77 |
| 07/87 | 831.26 | 829.63 | 816.75 | 811.67 | 814.24 |
| 10/87 | 829.94 | 828.98 | 813.70 | 814.64 | 815.68 |
| 04/88 | 828.90 | 823.37 | 808.70 | 811.81 | 813.00 |
| 07/88 | 831.00 | 822.35 | 815.35 | 807.91 | 812.63 |
| 10/88 | 829.99 | 829.52 | 815.62 | 811.68 | 813.15 |
| 04/89 | 831.41 | 828.90 | 818.43 | 811.80 | 817.22 |
| 05/90 | -- | 830.71 | 818.20 | 807.67 | 817.96 |
| 07/90 | 827.27 | 831.02 | 819.07 | 811.77 | 818.80 |
| 10/90 | 829.63 | 831.51 | 819.23 | 811.03 | 819.12 |
| 04/91 | 826.58 | 826.60 | 817.98 | 808.26 | 817.91 |
| 09/91 | 830.56 | 829.33 | 820.19 | -- | 820.27 |
| 01/92 | 826.56 | 828.73 | 819.50 | 812.12 | 819.42 |
| 05/92 | 827.20 | 829.41 | 819.34 | 812.17 | 820.21 |
| 11/92 | 827.67 | 830.60 | 820.15 | 815.62 | 820.43 |
| 05/93 | 827.24 | 829.56 | 818.46 | 807.05 | 818.74 |
| 11/93 | 828.06 | 830.81 | 819.26 | 810.43 | 819.83 |
| 08/96 | 835.18 | 829.93 | 817.84 | 816.22 | 818.41 |

-- Not measured due to restricted site access.

(1) Site glacial drift pump-out wells.

(2) Down-gradient glacial drift pump-out wells.

TABLE B-6

HISTORICAL WATER QUALITY DATA
GLACIAL DRIFT WELLS
TRICHLOROETHENE

(concentrations in ug/L)

| DATE | B ----- | Q ----- | R ----- | S ----- | T ----- |
|--------|------------|------------|------------|------------|------------|
| 04/82 | 6.0 | -- | -- | -- | -- |
| 12/82 | 1100 | -- | -- | -- | -- |
| 12/83 | 780 | -- | -- | -- | -- |
| 02/84 | -- | <1.3 | 670 | 770 | <1.3 |
| 10/85 | 1200 | 20 | 1100 | 740 | <0.3 |
| 12/85 | 1100 | 14 | 820 | 750 | <0.8 |
| 02/86 | 1300 | 11 | 31 | 650 | <0.5 |
| 04/86 | 1000 | 13 | DRY | 1100 | <0.2 |
| 06/86 | 1100 | 4.7 | 160 | 930 | <0.2 |
| 08/86 | 1000 | 5.6 | DRY | 880 | <0.2 |
| 10/86 | -- | 3.2 | -- | 620 | <0.2 |
| 11/86 | 830 | -- | -- | -- | -- |
| 04/87 | 800 | 2.6 | DRY | 650 | <0.2 |
| 07/87 | -- | -- | DRY | 740 | -- |
| 10/87 | -- | -- | -- | 1000 | -- |
| 04/88* | 330 | 0.86 | DRY | 460 | <0.50 |
| 07/88* | -- | -- | DRY | 160 | -- |
| 10/88* | -- | -- | DRY | 110 | -- |
| 04/89 | 250 | 1.1 | DRY | 860 | <0.5 |
| 07/89 | -- | -- | DRY | 620 | -- |
| 10/89 | -- | -- | DRY | 630 | -- |
| 05/90 | -- | 0.7 | DRY | 710 | <0.5 |
| 07/90 | 330 | -- | DRY | 200 | -- |
| 10/90 | -- | -- | DRY | 770 | -- |
| 04/91 | 340 | 0.7 | -- | 870 | <0.5 |
| 09/91 | -- | -- | -- | 480 | -- |
| 05/92 | 510 | <1.0 | -- | 510 | <1.0 |
| 11/92 | -- | -- | -- | 770 | -- |
| 05/93 | 580 | <0.50 | -- | 390 | <0.50 |
| 11/93 | -- | -- | -- | 400 | -- |
| 08/94 | -- | <0.5 | -- | -- | <0.5 |
| 09/95 | -- | <0.50 | -- | -- | <0.50 |
| 08/96 | -- | <0.5 | -- | -- | <0.5 |

-- Not analyzed.

* The 1988 analytical data has been determined to be unreliable due to laboratory equipment and method performance problems.

2, .014

TABLE B-6 (cont.)

HISTORICAL WATER QUALITY DATA
GLACIAL DRIFT WELLS
TRICHLOROETHENE

(concentrations in ug/L)

| DATE | U ----- | V ----- | W ----- | X ----- |
|--------|------------|------------|------------|------------|
| 02/84 | <1.3 | -- | -- | -- |
| 03/84 | -- | 78 | 7.5 | 2.2 |
| 10/85 | 2.6 | 220 | 8.1 | 2.1 |
| 12/85 | 3.9 | 140 | 32 | 5.0 |
| 02/86 | 2.9 | 180 | 14 | 0.9 s |
| 04/86 | 3.2 | 170 | 18 | 0.9 |
| 06/86 | 1.6 | 97 | 10 | 0.9 |
| 08/86 | 16 | 130 | 18 | 0.7 |
| 10/86 | 1.4 | 92 | 6.2 | 0.5 |
| 04/87 | 2.7 | 160 | 24 | -- |
| 07/87 | -- | 180 | 42 | -- |
| 10/87 | -- | 140 | 56 | -- |
| 04/88* | -- | 160 | 43 | DRY |
| 07/88* | -- | 33 | 8.1 | -- |
| 10/88* | -- | 37 | 26 | -- |
| 04/89 | -- | 130 | 57 | DRY |
| 07/89 | -- | 120 | 22 | -- |
| 10/89 | -- | 120 | 25 | -- |
| 05/90 | -- | 110 | 31 | DRY |
| 07/90 | -- | 120 | <0.5 | -- |
| 10/90 | -- | 110 | 11 | -- |
| 04/91 | 2.0 | 130 | 40 | -- |
| 09/91 | -- | 73 | 20 | -- |
| 05/92 | <1.0 | 63 | 5.9 | <1.0 |
| 11/92 | -- | 83 | 1.3 | -- |
| 05/93 | 0.7 | 68 | 2.9 | <0.50 |
| 11/93 | -- | 100 | 2.9 | -- |
| 08/94 | -- | 69 | 8.4 | <0.5 |
| 09/95 | -- | 94 | 0.80 | <0.50 |
| 08/96 | -- | 100 | 1.4 | <0.5 |

-- Not analyzed.

s Potential false positive value based on data validation procedures.

* The 1988 analytical data has been determined to be unreliable due to laboratory equipment and method performance problems.

2,.015

TABLE B-6 (cont.)

HISTORICAL WATER QUALITY DATA
GLACIAL DRIFT WELLS
TRICHLOROETHENE

(concentrations in ug/L)

| DATE | 1 ----- | 3 ----- | 4 ----- |
|--------|------------|------------|------------|
| 04/82 | 6.0 | 780 | 4.5 |
| 12/83 | 27 | 800 | 380 |
| 10/85 | 1.4 | 1100 | -- |
| 11/85 | -- | -- | 440 |
| 12/85 | 1.5 | 770 | 440 |
| 02/86 | 1.4 s | 680 | 200 |
| 04/86 | 3.1 | 1200 | 210 |
| 06/86 | 8.1 | 1300 | 180 |
| 08/86 | 9.3 | 890 | 280 |
| 10/86 | 0.9 | 720 | 200 |
| 04/87 | 2.7 | 740 | 120 |
| 07/87 | 0.4 | 770 | -- |
| 10/87 | 0.8 | 960 | -- |
| 04/88* | <0.50 | 440 | 55 |
| 07/88* | 0.5 | 140 | -- |
| 10/88* | <0.50 | 98 | -- |
| 04/89 | 0.8 | 320 | 55 |
| 07/89 | 0.6 s | 340 | -- |
| 10/89 | 0.5 | 530 | -- |
| 05/90 | -- | 520 | 77 |
| 07/90 | 0.8 | 770 | -- |
| 10/90 | <0.5 | 310 | -- |
| 04/91 | 3.1 | 1500 | -- |
| 09/91 | 1.3 | 300 | -- |
| 05/92 | 2.2 | 400 | -- |
| 11/92 | 0.5 | 170 | -- |
| 05/93 | <0.50 | 470 | -- |
| 11/93 | <0.50 | 740 | -- |

-- Not analyzed.

s Potential false positive value based on data validation procedures.

* The 1988 analytical data has been determined to be unreliable due to laboratory equipment and method performance problems.

TABLE B-7

HISTORICAL WATER QUALITY DATA
CARIMONA MEMBER WELLS
TRICHLOROETHENE

(concentrations in ug/L)

| DATE | BB ----- | RR ----- | SS ----- | UU ----- | WW ----- |
|--------|-------------|-------------|-------------|-------------|-------------|
| 05/82 | -- | 46 | -- | -- | -- |
| 06/82 | 1600 | -- | -- | -- | -- |
| 12/82 | 1600 | 43 | <0.05 | 78 | 2100 |
| 12/83 | 1400 | 33 | <1.5 | 81 | 1700 |
| 10/85 | 1900 | 110 | 0.4 s | 150 | 2300 |
| 12/85 | 1100 | 95 | 1.2 | 79 | 1200 |
| 02/86 | 1300 | 88 | <0.5 | 71 | 740 |
| 04/86 | 2200 | 170 | 0.4 | 81 | 540 |
| 06/86 | 2100 | 85 | 0.3 | 37 | 290 |
| 08/86 | 1800 | 100 | 0.3 | 45 | 220 |
| 10/86 | -- | -- | <0.2 | 36 | -- |
| 11/86 | 1300 | 100 | -- | -- | 290 |
| 04/87 | 1100 | 110 | 1.2 | 12 | 290 |
| 04/88* | 530* | 220 | <0.50 | 23 | 320 |
| 04/89 | 340 | 180 | 1.3 | 38 | 530 |
| 05/90 | -- | 60 | 4.1 | 35 | 450 |
| 07/90 | 530 | -- | -- | -- | -- |
| 04/91 | 1100 | 150 | 4.5 | 64 | 420 |
| 09/91 | -- | -- | -- | -- | -- |
| 05/92 | 870 | 90 | 2.2 | 23 | 700 |
| 05/93 | 940 | 93 | 2.5 | 29 | 130 |
| 08/94 | -- | -- | 1.0 | 8.6 | -- |
| 09/95 | -- | -- | 0.89 | 6.0 | -- |
| 08/96 | -- | -- | 2.2 | 47 | -- |

-- Not analyzed.

s Potential false positive value based on data validation procedures.

* The 1988 analytical data has been determined to be unreliable due to laboratory equipment and method performance problems.

2, .017

TABLE B-7 (cont.)

HISTORICAL WATER QUALITY DATA
CARIMONA MEMBER WELLS
TRICHLOROETHENE

(concentrations in ug/L)

| DATE | 8 | 9 | 10 | 11 | 12 | 13 | 108 |
|--------|-------|-------|-------|-------|-------|-------|-------|
| | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 04/83 | 820 | -- | -- | -- | -- | -- | -- |
| 11/83 | -- | -- | -- | -- | -- | -- | 1100 |
| 12/83 | 96 | <0.05 | 2.6 | 120 | <1.5 | -- | -- |
| 01/84 | -- | -- | -- | -- | -- | -- | 1100 |
| 03/84 | -- | -- | -- | -- | -- | 25 | -- |
| 10/85 | 2300 | 17 | 1500 | 2.7 | -- | 1.9 | -- |
| 11/85 | -- | -- | -- | -- | <0.2 | -- | 1500 |
| 12/85 | 650 | 10 | 1100 | 520 | <0.8 | 21 | 820 |
| 02/86 | 240 | 6.7 | 420 | 250 | <0.5 | 9.7 | 700 |
| 04/86 | 180 | 8.0 | 290 | 120 | 0.5 | 120 | 750 |
| 06/86 | 140 | 6.1 | 280 | 58 | <0.2 | 130 | 640 |
| 08/86 | 160 | 6.7 | 270 | 67 | 0.2 | 14 | 580 |
| 10/86 | 110 | 5.4 | 220 | 40 | <0.2 | 0.5 | 540 |
| 04/87 | 86 | 5.1 | 120 | 160 | <0.2 | 140 | 450 |
| 07/87 | -- | 0.6 | 150 | 25 | <0.2 | -- | 580 |
| 10/87 | -- | 9.5 | 170 | 180 | <0.5 | -- | 560 |
| 04/88* | 160 | 4.5 | 56 | 79 | <0.5 | <0.50 | 200 |
| 07/88* | -- | 1.7 | 34 | 0.3 | <0.5 | -- | 96 |
| 10/88* | -- | 10 | 58 | 0.7 | 1.0 s | -- | 87 |
| 04/89 | 380 | 9.8 | 160 | 110 | <0.5 | 110 | 530 |
| 07/89 | -- | 9.9 | 99 | 3.6 | 2.1 | -- | 340 |
| 10/89 | -- | 12 | 140 | 5.0 | <0.5 | -- | -- |
| 12/89 | -- | -- | -- | -- | -- | -- | 490 |
| 05/90 | 100 | 8.5 | 150 | <0.5 | 0.7 | 110 | 570 |
| 07/90 | -- | 43 | 180 | 16 | <0.5 | -- | 400 |
| 10/90 | -- | 9.4 | 130 | 240 | <0.5 | -- | 420 |
| 04/91 | 80 | 7.3 | 110 | 8.7 | <0.5 | <0.5 | 710 |
| 09/91 | -- | 10 | 120 | 3.2 | <0.5 | -- | 76 |
| 05/92 | 47 | 3.2 | 58 | 190 | <1.0 | 71 | 380 |
| 11/92 | -- | 2.4 | 59 | 66 | <0.5 | -- | -- |
| 05/93 | 92 | 1.9 | 46 | 120 | <0.50 | 26 | -- |
| 06/93 | -- | -- | -- | -- | -- | -- | 640 |
| 11/93 | -- | 0.78 | 43 | 180 | <0.50 | -- | 300 |
| 08/94 | 38 | 0.81 | 20 | 21 | <0.5 | -- | -- |
| 09/95 | 40 | -- | 38 | 3.3 | <0.50 | -- | -- |
| 01/96 | -- | <0.50 | -- | -- | -- | -- | -- |
| 08/96 | 35 | 3.0 | 24 | 17 | <0.5 | -- | -- |

-- Not analyzed.

s Potential false positive value based on data validation procedures.

* The 1988 analytical data has been determined to be unreliable due to laboratory equipment and method performance problems.

2, .005

TABLE B-8

HISTORICAL WATER QUALITY DATA
MAGNOLIA MEMBER WELLS
TRICHLOROETHENE

(concentrations in ug/L)

| DATE | 00 ----- | QQ ----- | TT ----- | VV ----- | ZZ ----- |
|--------|-------------|-------------|-------------|-------------|-------------|
| 05/82 | 15 | -- | -- | -- | -- |
| 06/82 | -- | 13 | -- | -- | -- |
| 12/82 | 56 | 13 | 8.9 | -- | -- |
| 03/84 | -- | -- | -- | -- | 14 |
| 10/85 | 49 | 2.9 | 26 | 140 | 85 |
| 12/85 | 31 | 7.3 | 19 | 93 | 28 |
| 02/86 | 36 | 5.2 | 27 | 92 | 200 |
| 04/86 | 120 | 6.0 | 33 | 280 | 440 |
| 06/86 | 27 | 1.0 | 20 | 83 | 91 |
| 08/86 | 19 | 0.6 | 40 | 99 | 39 |
| 10/86 | 32 | 6.4 | 23 | 77 | 190 |
| 04/87 | 130 | 2.5 | 34 | 63 | 230 |
| 04/88* | 160 | <0.50 | 16 | 63 | 130 |
| 07/88* | 20 | -- | -- | 9.4 | -- |
| 10/88* | 34 | -- | -- | 25 | 43 |
| 04/89 | 90 | 3.7 | 30 | 59 | 180 |
| 07/89 | 70 | -- | -- | 87 | 34 |
| 10/89 | 67 | -- | -- | 150 | 33 |
| 05/90 | 58 | 3.4 | 26 | 33 | 120 |
| 07/90 | 62 | -- | -- | 27 | 61 |
| 10/90 | 30 | -- | -- | 46 | 36 |
| 04/91 | 5.1 | <0.5 | 140 | 75 | 170 |
| 09/91 | 5.0 | -- | -- | 48 | -- |
| 05/92 | 3.1 | -- | 58 | 60 | 88 |
| 06/92 | -- | 4.7 | -- | -- | -- |
| 11/92 | 17 | -- | 6.4 | 29 | 96 |
| 05/93 | 11 | 13 | 0.7 | 190 | 73 |
| 11/93 | 5.7 | -- | 1.8 | 150 | 70 |
| 08/94 | -- | 3.2 | 1.4 | -- | -- |
| 09/95 | -- | 3.7 | 1.5 | -- | -- |
| 08/96 | -- | 2.2 | 1.0 | -- | -- |

-- Not analyzed.

* The 1988 analytical data has been determined to be unreliable due to laboratory equipment and method performance problems.
2,.007

TABLE B-9

HISTORICAL WATER QUALITY DATA
ST. PETER SANDSTONE WELLS
TRICHLOROETHENE

(concentrations in ug/L)

| DATE | 200 | 201 | 202 | 203 |
|--------|-------|-------|-------|-------|
| | ----- | ----- | ----- | ----- |
| 10/85 | -- | 0.5 s | -- | -- |
| 11/85 | 120 | -- | 2.6 | 0.5 s |
| 12/85 | 100 | 2.9 | 2.0 | 1.2 |
| 02/86 | 72 | <0.5 | 1.9 | 2.5 |
| 04/86 | 130 | <0.2 | 0.2 | 0.6 |
| 06/86 | 110 | <0.2 | 0.2 s | 0.5 |
| 08/86 | 110 | <0.2 | 2.7 | 0.5 |
| 10/86 | 78 | <0.2 | <0.2 | 0.5 |
| 04/87 | 100 | 0.1 | <0.2 | 0.7 |
| 07/87 | 120 | -- | -- | -- |
| 10/87 | 160 | -- | -- | -- |
| 04/88* | 89 | <0.50 | <0.50 | <0.50 |
| 07/88* | 33 | -- | -- | -- |
| 10/88* | 56 | -- | -- | -- |
| 04/89 | 150 | <0.5 | <0.5 | 2.1 |
| 07/89 | 130 | -- | -- | -- |
| 10/89 | 120 | -- | -- | -- |
| 05/90 | 110 | <0.5 | 0.8 | 2.8 |
| 07/90 | 11 | -- | -- | -- |
| 10/90 | 130 | -- | -- | -- |
| 04/91 | 140 | <0.5 | <0.5 | 3.0 |
| 09/91 | 77 | -- | -- | -- |
| 05/92 | 61 | <1.0 | <1.0 | 1.2 |
| 11/92 | 64 | -- | -- | -- |
| 05/93 | 89 | <0.50 | <0.50 | 1.4 |
| 11/93 | 19 | -- | -- | -- |
| 12/94 | 110 | -- | -- | -- |
| 09/95 | 110 | -- | -- | -- |
| 08/96 | 96 | -- | -- | -- |

-- Not analyzed.

s Potential false positive value based on data validation procedures.

* The 1988 analytical data has been determined to be unreliable due to laboratory equipment and method performance problems.

2,.008

TABLE B-10

HISTORICAL WATER QUALITY DATA
PRAIRIE DU CHIEN/JORDAN WELL
TRICHLOROETHENE

(concentrations in ug/L)

| DATE | HENKEL ----- |
|--------|-----------------|
| 10/85 | 71 |
| 12/85 | 44 |
| 02/86 | 48 |
| 04/86 | OFF |
| 06/86 | OFF |
| 08/86 | 54 |
| 11/86 | 6.9 |
| 04/87 | 7.1 |
| 07/87 | 20 |
| 10/87 | 6.7 |
| 04/88* | 13 |
| 07/88* | 1.5 |
| 10/88* | 8.0 |
| 04/89 | 12 |
| 07/89 | 10 |
| 10/89 | 11 |
| 07/91 | 49 |
| 09/91 | 18 |
| 05/92 | 31 |
| 11/92 | <0.5 |
| 05/93 | 16 |
| 11/93 | 36 |
| 08/94 | 6.1 |
| 12/95 | 6.5 |
| 08/96 | 9.2 |

* The 1988 analytical data has been determined to be unreliable due to laboratory equipment and method performance problems.
2,.006

TABLE B-11

HISTORICAL WATER QUALITY DATA
SITE PUMP-OUT AND TREATMENT SYSTEM
DOWNGRAIDENT PUMP-OUT SYSTEM
TRICHLOROETHENE

(concentrations in ug/L)

| DATE | (1) DISCHARGE | (2) INFLUENT | (3) EFFLUENT | (4) MG EFFLUENT |
|--------|------------------|-----------------|-----------------|--------------------|
| ----- | ----- | ----- | ----- | ----- |
| 11/85 | 160 | 1200 | 13 | -- |
| 12/85 | 140 | 870 | 12 | -- |
| 01/86 | -- | 1100 | 17 | -- |
| 02/86 | 290 | 760 | 8.4 | -- |
| 03/86 | -- | 1700 | 14 | -- |
| 04/86 | 400 | 860 | 11 | -- |
| 06/86 | 250 | -- | -- | -- |
| 08/86 | 350 | 870 | 6.7 | -- |
| 10/86 | 190 | 610 | 1.0 | -- |
| 03/87 | 320 | 730 | 6.8 | -- |
| 04/87 | 170 | 530 | 8.3 | -- |
| 07/87 | 310 | 660 | 2.8 | -- |
| 10/87 | 230 | 720 | <0.5 | -- |
| 11/87 | -- | 490 | 2.6 | -- |
| 01/88* | 300 | 470 | 4.4 | -- |
| 04/88* | 210 | 370 | 5.3 | -- |
| 07/88* | 70 | 160 | 1.2 | -- |
| 10/88* | 64 | -- | -- | -- |
| 11/88* | -- | 84 | 3.7 | -- |
| 01/89 | 210 | 390 | 9.8 | -- |
| 04/89 | 200 | 440 | 13 | -- |
| 07/89 | 170 | 380 | 20 | -- |
| 10/89 | 110 | -- | -- | -- |
| 12/89 | -- | 140 | 190 | -- |
| 01/90 | 140 | 380 | 96 | -- |
| 05/90 | 220 | 370 | 1.2 | -- |
| 07/90 | 180 | 310 | 0.9 | -- |
| 10/90 | 100 | 360 | 2.9 | -- |
| 01/91 | 150 | 430 | 0.8 | -- |
| 04/91 | 290 | 890 | 1.0 | -- |
| 07/91 | 210 | 370 | <0.5 | -- |
| 09/91 | 110 | 320 | <0.5 | -- |
| 01/92 | 99 | 260 | <1.0 | -- |
| 05/92 | 55 | 320 | 8.3 | -- |
| 08/92 | 78 | 420 | 15 | -- |
| 11/92 | 110 | 450 | 28 | 32 |

-- Not analyzed.

(1) Flow rate weighted composite sample (pump-out wells 111, 112, and 113)

(2) Flow rate weighted composite sample (pump-out wells 108, 109, and 110)

(3) Effluent from treatment system.

(4) Effluent from site pump-out wells MG1 and MG2.

* The 1988 analytical data has been determined to be unreliable due to laboratory equipment and method performance problems.

2,.009

TABLE B-11 (cont.)

HISTORICAL WATER QUALITY DATA
SITE PUMP-OUT AND TREATMENT SYSTEM
DOWNGRAIDENT PUMP-OUT SYSTEM
TRICHLOROETHENE

(concentrations in ug/L)

| | (1) | (2) | (3) | (4) |
|-------|-----------|----------|----------|-------------|
| DATE | DISCHARGE | INFLUENT | EFFLUENT | MG EFFLUENT |
| | ----- | ----- | ----- | ----- |
| 03/93 | 130 | 270 | <0.50 | -- |
| 05/93 | 82 | 450 h | <0.50 | 22 |
| 08/93 | 83 | 530 | <0.50 | 33 |
| 11/93 | 78 | 630 | <0.50 | 24 |
| 03/94 | 140 | 540 | <0.5 | 25 |
| 06/94 | 60 | 430 | <0.5 | 23 |
| 08/94 | 58 | 310 | <0.5 | 17 |
| 12/94 | 65 | 400 | <0.50 | 18 |
| 03/95 | 93 | 650 | 7.6 | 26 |
| 05/95 | 87 | 580 | 20 | 25 |
| 09/95 | 53 | 450 | 0.63 | 15 |
| 12/95 | 68 | 410 | 2.7 | 15 |
| 03/96 | 63 | 360 | 38 | 18 |
| 07/96 | 77 | 390 | 1.0 | 21 |
| 08/96 | 40 | 400 | 64 | 19 |
| 11/96 | 59 | 370 | <0.5 | 22 |

-- Not analyzed.

h EPA sample extraction or analysis holding time was exceeded.

(1) Flow rate weighted composite sample (pump-out wells 111, 112, and 113)

(2) Flow rate weighted composite sample (pump-out wells 108, 109, and 110)

(3) Effluent from treatment system.

(4) Effluent from site pump-out wells MG1 and MG2.

* The 1988 analytical data has been determined to be unreliable due to laboratory equipment and method performance problems.

2,.009

Appendix C

*East Hennepin Avenue Site 1994-1999
Operations and Monitoring Plan*

Appendix C

East Hennepin Avenue Site 1994–1999 Operations and Monitoring Plan

The following monitoring plan governs the period January 1, 1994 to December 31, 1999. The plan is consistent with the terms of the Consent Order, and is suitable for a site with a status characterized as long-term operation and monitoring.

Intensive monitoring of the East Hennepin Avenue site has occurred since February 1984. The results from this monitoring have defined the limits of groundwater contamination; have documented the effectiveness of the site groundwater pumpout systems; and have documented that site conditions in all affected aquifers have been stable since 1987.

The Consent Order specifies that the purpose of the groundwater monitoring program is to: monitor the effectiveness of the groundwater pumpout systems; define changes in the distribution of volatile hydrocarbon concentrations; and determine when operation of the system can be shut down.

The effectiveness of groundwater pumpout systems has been determined through aquifer pumping tests and groundwater modeling. The operational history (pumping rates and total gallons pumped) has been monitored since 1985. This time period includes both record wet and record dry years.

General Mills, Inc. has agreed to monitor the continued effectiveness of the pumpout systems through water quality monitoring and through operational monitoring. Water quality monitoring will involve the annual collection of groundwater samples from down gradient Glacial Drift Wells Q, T, V, W and X; Platteville Wells 8, 9, 10, 11, 12, QQ, SS, TT and UU; St. Peter Well 200 and the Henkel Well. The samples will be analyzed on alternating years for trichloroethylene and List 2 volatile organic compounds (Table 1).

Operational monitoring will involve the comparison of monthly mean pumping rates with historical pumping rates. If pumping rates fall below an action level (Table 2), an assessment of the operational status of the well will be conducted and necessary repairs will be made.

Platteville Formation pumpout system operational monitoring will also include an annual 24-hour recovery test. This test will be conducted to determine if Magnolia member Pumpout Wells MG1 and MG2 are maintaining an adequate capture zone in the Platteville Formation. The recovery test will involve the measurement of water levels in Wells RR, SS, VV, OO, TT and WW. Water levels will be measured prior to, and 24-hours after an annual shutdown of Pumpout Wells MG1 and MG2. The data will be evaluated to determine if the Magnolia wells continue to generate similar drawdown as was observed during the 1992 pumping test.

NPDES monitoring will continue as specified in the permits. NPDES monitoring currently involves the collection of effluent water quality samples from each pumpout system and the stripper tower. In addition to trichloroethylene and List 2 volatile organic compounds, priority pollutant volatile organic compounds and flow rate measurements are required on a routine basis.

Quarterly letter reports describing the results of operations, monitoring and maintenance will be prepared and submitted to the Minnesota Pollution Control Agency. The reports will contain tables summarizing operational and monitoring data. Laboratory data reports will be attached to the report. Any data which indicates a long-term change in the operational status or effectiveness of the pumpout systems will be discussed in detail. A description of any action taken in response to this information will also be documented.

Table C-1

List 2 Volatile Organic Compounds

Volatile Organic Compounds

1,1-Dichloroethane
1,2-Dichloroethane
1,2-Dichloroethylene, cis
1,2-Dichloroethylene, trans
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
1,1,1-Trichloroethane
Trichloroethylene

Non-Chlorinated Volatile Organic Compounds

Benzene
Toluene
Xylenes

Table C-2
Pumpout System Operation Guidelines
Pumping Rates

| Pumpout Well Identification | Target Pumping Rate (Average Monthly gpm) | Action Level (Average Monthly gpm) |
|------------------------------------|--|---|
| Well 109 | 30 | 20 |
| Well 110 | 50 | 40 |
| Well 111 | 90 | 80 |
| Well 112 | 100 | 80 |
| Well 113 | 90 | 80 |
| Well MG1 | 100 | 80 |
| Well MG2 | 100 | 80 |

If action levels are not met, an assessment of the operational status of the pumpout well will be undertaken and any necessary repairs will be made.

Appendix D

Laboratory Data Reports



CH2MHILL

Ms. Marti Harding-Smith
Barr Engineering Company
8300 Norman Center Dr.
Minneapolis, MN 55437-1026

CH2M HILL

Analytical Services

5090 Caterpillar Road

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JMR

RECEIVED

DEC 19 1996

**BARR
ENGINEERING CC**

Analytical Report
Barr Engineering Company
RC423

December 18, 1996

Submitted by:

Brian Geers
Project Manager/Client Services

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CH2M Hill Lab Reference No.: RC423
Level 1

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Organic Data Qualifiers

- A -- This qualifier indicates that a TIC is a suspected aldol-condensation product.
- B-- This flag is used when the analyte is found in the associated blank as well as the sample. This notation indicates possible blank contamination and suggests that the data user evaluate these compounds and their amounts carefully.
- C-- The "C" flag indicates the presence of this compound has been confirmed by the GC/MS analysis.
- D-- This qualifier is used for all compounds identified in an analysis at a secondary dilution factor. "D" qualifiers are used only for the samples reported at more than one dilution factor.
- E-- This flag indicates that the value reported exceeds the linear calibration range for the compound. Therefore, the sample should be reanalyzed at the appropriate dilution. The "E" qualified amount is an estimated concentration, and the results of the dilution will be reported on a separate Form I.
- I-- This qualifier indicates that the reporting limit adjacent to the "I" qualifier has been raised. It is used when chromatographic interference prohibits detection of a compound at a level below the concentration expressed on the Form I.
- J-- Indicates an estimated value. It is used when the data indicates the presence of a target compound below the reporting limit or the presence of a Tentatively Identified Compound (TIC)
- N-- This qualifier indicates presumptive evidence of a compound. This flag is only used for Tentatively Identified Compounds (TIC), where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic characterization of a TIC, such as a chlorinated hydrocarbon, the "N" qualifier is not used.
- P-- This qualifier is used for pesticide/Aroclor target analytes when there is a greater than 25% difference for detected concentrations between the two columns. The lower of the two values is reported on Form I and flagged with a "P".
- U-- Indicates the compound was analyzed for but not detected. The number adjacent to the "U" qualifier indicates the reporting limit for that compound. The reporting limit can vary from sample to sample depending on dilution factors or percent moisture adjustments when indicated.

Organic Sample ID Qualifiers

The qualifiers that may be appended to the Lab Sample ID and/or the Client Sample ID for organic analysis are defined below:

- DL --** Diluted reanalysis . Indicates that the results were determined in an analysis of a secondary dilution of a sample or extract. The "DL" suffix may be followed by a digit to indicate multiple dilutions of the sample or extract. The results of more than one diluted reanalyses may be reported.
- MS--** Matrix spike (may be followed by a digit to indicate multiple matrix spikes within a sample set).
- MSD--**Matrix spike duplicate (may be followed by a digit to indicate multiple matrix spikes within a sample set).
- R--** Reanalysis. The extract was reanalyzed without re-extraction. The "R" is not used if the sample was also re-extracted. May be followed by a digit to indicate multiple reanalyses of the sample at the same dilution.
- RE--** Re-extraction analysis. The sample was re-extracted and reanalyzed. May be followed by a digit to indicate multiple re-extracted analyses of the same sample at the same dilution.

Sample ID Cross-reference Table

| CH2M Hill Lab Sample ID | Client Sample ID | Collect Date | Sample Matrix | Additional Description |
|--|---------------------|-----------------|---------------|------------------------|
| FS = Field Sample; MSD = Matrix Spike Duplicate; MSO = Matrix Spike, Organic | | | | |
| RC423001 | FS M6-EFF | 11/04/96 | Water | |
| RC423002 | FS INF | 11/04/96 | Water | |
| RC423003 | FS EFF | 11/04/96 | Water | |
| RC423004 | FS DSCHG | 11/04/96 | Water | |
| RC423005 | FS M-1 | 11/04/96 | Water | |
| RC423006 | FS FB-1 | 11/04/96 | Water | |
| RC423007 | FS TB-1 | 11/04/96 | Water | |

The above lab sample ID's and cross reference information apply to samples as received by the laboratory. Modifiers to the lab sample ID may be added for internal tracking purposes. Any modified sample ID will be reflected in the appropriate case narrative only.

GC PURGEABLE HALOCARBONS/AROMATICS

CASE NARRATIVE
GC PURGEABLE HALOCARBONS/AROMATICS

CH2M Hill Lab Reference No./SDG.: RC423

Project: Barr Engineering Company

I. RECEIPT

No exceptions were encountered unless a Sample Receipt Exception Report is attached to the Chain-of-Custody included with this data package.

II. HOLDING TIMES

- A. Sample Preparation: All holding times were met.
- B. Sample Analysis: All holding times were met.

III. METHOD

Preparation: N/A
Cleanup: N/A
Analysis: EPA 601/602

IV. PREPARATION

Sample preparation proceeded normally.

V. ANALYSIS

- A. Calibration : All acceptance criteria were met.
- B. Blanks: All acceptance criteria were met.
- C. Surrogates: All acceptance criteria were met.
- D. Spikes: All acceptance criteria were met.
- E. Samples: Sample RC423002 was analyzed on a diluted basis due to the concentration of target analytes. Reporting limits have been adjusted accordingly.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and QAL, Inc., both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

SIGNED: *Douglas Burnett*
for Douglas Burnett
Resource Chemist, Organics

DATE: 12-18-96

Report of Analytical Results

Client Sample ID: M6-EFF.
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 11/04/96 12:00 (Mon) Reference No: RC423
Date Received: 11/05/96 09:20 (Tue) Lab Sample ID: RC423001
Date Extracted: None Site: N/A
Date Analyzed: 11/16/96 00:00 (Sat)

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 22 | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.8 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 99 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 95 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: INF
Sample Description: None
Sample Matrix: Water
Dilution: 5.00

Date Collected: 11/04/96 12:00 (Mon) Reference No: RC423
Date Received: 11/05/96 09:20 (Tue) Lab Sample ID: RC423002
Date Extracted: None Site: N/A
Date Analyzed: 11/16/96 00:00 (Sat)

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 2 U | ug/L | 2 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 2 U | ug/L | 2 |
| 1,1-Dichloroethane | 75-34-3 | 2 U | ug/L | 2 |
| 1,2-Dichloroethane | 107-06-2 | 2 U | ug/L | 2 |
| Benzene | 71-43-2 | 2 U | ug/L | 2 |
| Tetrachloroethene | 127-18-4 | 3 | ug/L | 2 |
| Toluene | 108-88-3 | 2 U | ug/L | 2 |
| Trichloroethene | 79-01-6 | 370 | ug/L | 2 |
| Xylenes (Total) | XYLENES | 2 U | ug/L | 2 |
| trans-1,2-Dichloroethene | 156-60-5 | 2 U | ug/L | 2 |
| cis-1,2-Dichloroethene | 156-59-2 | 24 | ug/L | 2 |
| Fluorobenzene - SS | 462-06-6 | 98 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 94 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: EFF
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 11/04/96 12:00 (Mon) Reference No: RC423
Date Received: 11/05/96 09:20 (Tue) Lab Sample ID: RC423003
Date Extracted: None Site: N/A
Date Analyzed: 11/11/96 00:00 (Mon)

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 99 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 95 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: DSCHG
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 11/04/96 12:00 (Mon) Reference No: RC423
Date Received: 11/05/96 09:20 (Tue) Lab Sample ID: RC423004
Date Extracted: None Site: N/A
Date Analyzed: 11/16/96 00:00 (Sat)

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.6 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.6 | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 59 | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 5.6 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 100 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 92 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: M-1
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 11/04/96 12:00 (Mon) Reference No: RC423
Date Received: 11/05/96 09:20 (Tue) Lab Sample ID: RC423005
Date Extracted: None Site: N/A
Date Analyzed: 11/16/96 00:00 (Sat)

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 22 | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.8 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 101 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 94 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: FB-1
 Sample Description: None
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 11/04/96 12:00 (Mon) Reference No: RC423
 Date Received: 11/05/96 09:20 (Tue) Lab Sample ID: RC423006
 Date Extracted: None Site: N/A
 Date Analyzed: 11/15/96 00:00 (Fri)

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 102 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 98 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: TB-1
 Sample Description: None
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 11/04/96 12:00 (Mon) Reference No: RC423
 Date Received: 11/05/96 09:20 (Tue) Lab Sample ID: RC423007
 Date Extracted: None Site: N/A
 Date Analyzed: 11/15/96 00:00 (Fri)

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 103 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 98 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: VWB11111
 Sample Description: None
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: None
 Date Received: None
 Date Extracted: None
 Date Analyzed: 11/11/96 00:00 (Mon)

Reference No: LABQC
 Lab Sample ID: VWB11111
 Site: N/A

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 100 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 100 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: VWB11115
 Sample Description: None
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: None
 Date Received: None
 Date Extracted: None
 Date Analyzed: 11/15/96 00:00 (Fri)

Reference No: LABQC
 Lab Sample ID: VWB11115
 Site: N/A

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|----------------------|--------|-------|-----------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 101 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 96 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: VWB11116
 Sample Description: None
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: None
 Date Received: None
 Date Extracted: None
 Date Analyzed: 11/16/96 00:00 (Sat)

Reference No: LABQC
 Lab Sample ID: VWB11116
 Site: N/A

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 98 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 95 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: M6-EFFMS
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 11/04/96 12:00 (Mon) Reference No: RC423
Date Received: 11/05/96 09:20 (Tue) Lab Sample ID: RC423001MS
Date Extracted: None Site: N/A
Date Analyzed: 11/16/96 00:00 (Sat)

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 109 | %rec | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 97 | %rec | |
| 1,1-Dichloroethane | 75-34-3 | 96 | %rec | |
| 1,2-Dichloroethane | 107-06-2 | 102 | %rec | |
| Benzene | 71-43-2 | 102 | %rec | |
| Tetrachloroethene | 127-18-4 | 98 | %rec | |
| Toluene | 108-88-3 | 100 | %rec | |
| Trichloroethene | 79-01-6 | 115 | %rec | |
| Xylenes (Total) | XYLENES | 99 | %rec | |
| trans-1,2-Dichloroethene | 156-60-5 | 106 | %rec | |
| cis-1,2-Dichloroethene | 156-59-2 | 119 | %rec | |
| Fluorobenzene - SS | 462-06-6 | 101 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 92 | %rec | |

(7140)

Report of Analytical Results

Client Sample ID: M6-EFFMSD
 Sample Description: None
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 11/04/96 12:00 (Mon) Reference No: RC423
 Date Received: 11/05/96 09:20 (Tue) Lab Sample ID: RC423001MSD
 Date Extracted: None Site: N/A
 Date Analyzed: 11/16/96 00:00 (Sat)

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.9 | RPD | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 2.0 | RPD | |
| 1,1-Dichloroethane | 75-34-3 | 13 | RPD | |
| 1,2-Dichloroethane | 107-06-2 | 1.9 | RPD | |
| Benzene | 71-43-2 | 1.0 | RPD | |
| Tetrachloroethene | 127-18-4 | 2.1 | RPD | |
| Toluene | 108-88-3 | 1.0 | RPD | |
| Trichloroethene | 79-01-6 | 2.6 | RPD | |
| Xylenes (Total) | XYLENES | 1.0 | RPD | |
| trans-1,2-Dichloroethene | 156-60-5 | 1.0 | RPD | |
| cis-1,2-Dichloroethene | 156-59-2 | 2.6 | RPD | |
| Fluorobenzene - SS | 462-06-6 | 102 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 98 | %rec | |

(7140)

CHAIN OF CUSTODY DOCUMENTATION

Barr

Engineering Company

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Chain of Custody A

Project Number

23-27-169-P2S.002

No 21114

| Sample Identification | Collection | | Matrix | | | Type | Number of Containers/Preservative | | | | | | | | | | | | | Total No. Of Containers | Project Manager: | | Project Contact: | | Laboratory: | | Remarks/ Analysis Required: | |
|-----------------------|------------|------|--------|------|-------|------|-----------------------------------|-------|----|-----------------------------|---------------------------|-----------------------|----------------------------------|--------------------------------------|-----------------------|--|---|--|---------------------------------------|-------------------------|----------------------|--------|-------------------|--|-------------|--------------|--------------------------------|---------------|
| | Date | Time | Water | Soil | Other | | Grab | Comp. | QC | Volatiles Organic (Unpres.) | Volatiles Organic (Pres.) | Semivolatiles Organic | Total Metals (HNO ₃) | Dissolved Metals (HNO ₃) | General (Unpreserved) | Cyanide (N ₂ OH, Asc. Acid) | Nutrients (H ₂ SO ₄) | Oil and Grease (H ₂ SO ₄) | TOC (H ₂ SO ₄) | | Sulfide (Zn Acetate) | Dioxin | Whirlpak/Bacteria | Total Phenol (H ₂ SO ₄) | CM | MSH | | QAL - REDDING |
| 1. MG-EFF | 11-4-96 | | | | | | | | 3 | | | | | | | | | | | | | | | | | LIST 2 VOC'S | 1 | |
| 2. INF | | | | | | | | | 3 | | | | | | | | | | | | | | | | | see attached | 2 | |
| 3. EFF | | | | | | | | | 3 | | | | | | | | | | | | | | | | | | | 3 |
| 4. DSC4G | | | | | | | | | 3 | | | | | | | | | | | | | | | | | | | 4 |
| 5. M-1 | | | | | | | | | 3 | | | | | | | | | | | | | | | | | | | 5 |
| 6. FB-1 | | | | | | | | | 3 | | | | | | | | | | | | | | | | | | | 6 |
| 7. TB-1 | | | | | | | | | 3 | | | | | | | | | | | | | | | | | | | 7 |
| 8. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Relinquished By: Jim Johannesse Date: 11-4-96 Time:

Received by Lab: Donna L. Lusk Date: 11-13-96 Time: 0920

Remarks:

Air Bill Number: 2190573685

QC LEVEL 1 ICE Y

COG Y TEMP 3°C

CUST SEAL N PH SEE ATTACHED

CUS UPS FED-EX OTHER

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

0016

QAL Reference Number RC423

Project / Client BARK

pH LOG

By E. Smith Date 11/5/90

| QAL Sample No. | HNO3 pH < 2 | H2SO4 pH < 2 | ZnAc2/ NaOH pH > 9 | NaOH pH > 12 | HCl pH < 2 | | |
|----------------------|----------------|-----------------|--------------------------|-----------------|---------------|--|--|
| -001 | | | | | OK | | |
| -002 | | | | | OK | | |
| -003 | | | | | 7 | | |
| -004 | | | | | OK | | |
| -005 | | | | | OK | | |
| -006 | | | | | OK | | |
| -007 | | | | | OK | | |
| -008 | | | | | | | |
| -009 | | | | | | | |
| -010 | | | | | | | |
| -011 | | | | | | | |
| -012 | | | | | | | |
| -013 | | | | | | | |
| -014 | | | | | | | |
| -015 | | | | | | | |
| -016 | | | | | | | |
| -017 | | | | | | | |
| -018 | | | | | | | |
| -019 | | | | | | | |
| -020 | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

GENERAL MILLS 1994 MONITORING PLAN

PUMP OUT SYSTEM WELLS SAMPLED QUARTLY, MONITORING WELLS SAMPLED ANUALLY.

INFLUENT (PUMP OUT WELLS 109 AND 110) LIST 2 VOC'S
 EFFLUENT (PUMP OUT WELLS 109 AND 110) LIST 2 VOC'S
 MG-EFFLUENT (PUMP OUT WELLS MG1 AND MG2) LIST 2 VOC'S
 DISCHARGE (PUMP OUT WELLS 111,112,AND 113) LIST 2 VOC'S

| WELLS | EVEN YEARS | ODD YEARS |
|--------|------------|--------------|
| Q | TCE | LIST 2 VOC'S |
| T | TCE | LIST 2 VOC'S |
| V | TCE | LIST 2 VOC'S |
| W | TCE | LIST 2 VOC'S |
| X | TCE | LIST 2 VOC'S |
| 8 | TCE | LIST 2 VOC'S |
| 9 | TCE | LIST 2 VOC'S |
| 10 | TCE | LIST 2 VOC'S |
| 11 | TCE | LIST 2 VOC'S |
| 12 | TCE | LIST 2 VOC'S |
| QQ | TCE | LIST 2 VOC'S |
| SS | TCE | LIST 2 VOC'S |
| TT | TCE | LIST 2 VOC'S |
| uu | TCE | LIST 2 VOC'S |
| 200 | TCE | LIST 2 VOC'S |
| HENKEL | TCE | LIST 2 VOC'S |

LIST 2 VOC'S

1.1-DICHLOROETHANE
 1.2-DICHLOROETHANE
 1.2-DICHLOROETHYLENE,CIS
 1.2-DICHLOROETHYLENE,TRANS
 1.1.2.2-TETRACHLOROETHANE
 TETRACHLOROETHYLENE
 1.1.1-TRICHLOROETHANE
 TRICHLOROETHENE
 BENZENE
 TOLUENE
 XYLENES

LIST 2 VOC'S-EPA METHOD 601/602
 TCE-EPA METHOD 601



CH2MHILL

September 5, 1996

CH2M HILL

Analytical Services

5090 Caterpillar Road

Redding, CA

96003-1412

Tel 916.244.5227

Fax 916.244.4109

Ms. Marti Harding-Smith
Barr Engineering Company
8300 Norman Center Dr.
Minneapolis, MN 55437-1026

RECEIVED

SEP 06 1996

BARR
ENGINEERING CO.

RE: Analytical Data for
Barr Engineering Company

CH2M HILL Reference
RB983

Dear Ms. Harding-Smith:

On **August 15, 1996**, CH2M Hill Analytical Services received samples with a request for analysis. The analytical results and associated quality control data are enclosed.

It is our policy to store your samples for 30 days from the date of this letter. If extended storage is required, special arrangements can be accommodated upon early notification. The disposition of samples identified as hazardous will require special handling and you will be contacted if necessary.

CH2M Hill Analytical Services appreciates your business and looks forward to serving you again. If you have any questions concerning your report or need any additional information, please call me at (916) 244-5227.

Sincerely,

Brian Geers
Project Manager/Client Services

TABLE OF CONTENTS

QAL Lab Reference No.: RB983
Level 1

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| Case narrative | 2 |
| Sample results | 4 |
| Chain of Custody Documentation | 31 |

Sample ID Cross-reference Table

| CH2M Hill Lab Sample ID | Client Sample ID | Collect Date | Sample Matrix | Additional Description |
|--|---------------------|-----------------|---------------|------------------------|
| FB = Field Blank; FS = Field Sample; TB = Trip Blank | | | | |
| RB983001 | FS X | 08/13/96 | Water | GRAB |
| RB983002 | FS 8 | 08/13/96 | Water | GRAB |
| RB983003 | FS 9 | 08/13/96 | Water | GRAB |
| RB983004 | FS 10 | 08/13/96 | Water | GRAB |
| RB983005 | FS 12 | 08/13/96 | Water | GRAB |
| RB983006 | FS 200 | 08/13/96 | Water | GRAB |
| RB983007 | FS QQ | 08/13/96 | Water | GRAB |
| RB983008 | FS W | 08/14/96 | Water | GRAB |
| RB983009 | FS V | 08/14/96 | Water | GRAB |
| RB983010 | FS Q | 08/14/96 | Water | GRAB |
| RB983011 | FS 11 | 08/14/96 | Water | GRAB |
| RB983012 | FS T | 08/14/96 | Water | GRAB |
| RB983013 | FS UU | 08/14/96 | Water | GRAB |
| RB983014 | FS HENKEL | 08/14/96 | Water | GRAB |
| RB983015 | FS SS | 08/14/96 | Water | GRAB |
| RB983016 | FS TT | 08/14/96 | Water | GRAB |
| RB983017 | FS INF | 08/13/96 | Water | GRAB/COMP |
| RB983018 | FS EFF | 08/13/96 | Water | GRAB |
| RB983019 | FS M6-EFF | 08/13/96 | Water | GRAB/COMP |
| RB983020 | FS DISCHG | 08/13/96 | Water | GRAB/COMP |
| RB983021 | FS M-1 | 08/13/96 | Water | GRAB |
| RB983022 | TB TB-1 | 08/13/96 | Water | QC |
| RB983023 | FB FB-1 | 08/14/96 | Water | QC |
| RB983024 | FS M-2 | 08/14/96 | Water | GRAB |

The above lab sample ID's and cross reference information apply to samples as received by the laboratory. Modifiers to the lab sample ID may be added for internal tracking purposes. Any modified sample ID will be reflected in the appropriate case narrative only.

GC PURGEABLE HALOCARBONS/AROMATICS

CASE NARRATIVE
GC PURGEABLE HALOCARBONS/AROMATICS

CH2M Hill Lab Reference No./SDG.: RB983

Project: Barr Engineering Company

I. RECEIPT

No exceptions were encountered unless a Sample Receipt Exception Report is attached to the Chain-of-Custody included with this data package.

II. HOLDING TIMES

- A. Sample Preparation: All holding times were met.
- B. Sample Analysis: All holding times were met.

III. METHOD

Preparation: N/A
Cleanup: N/A
Analysis: EPA 601/602 (MOD)

IV. PREPARATION

Sample preparation proceeded normally.

V. ANALYSIS

- A. Calibration : All acceptance criteria were met.
- B. Blanks: All acceptance criteria were met.
- C. Surrogates: All acceptance criteria were met.
- D. Spikes: All acceptance criteria were met.
- E. Samples: Due to the concentration of target analytes, sample RB983017 (INF) was reanalyzed on a diluted basis in order to obtain a detector response within the linear calibration range of the instrument. The results of both analyses are included for your information. Reporting limits have been adjusted accordingly.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and QAL, Inc., both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

SIGNED: Douglas Burnett

Douglas Burnett
Resource Chemist, Organics

DATE: 9-3-96

CASE NARRATIVE
Addendum

Sample Information

| <u>LAB SAMPLE ID</u> | <u>CLIENT SAMPLE ID</u> | <u>SAMPLE MATRIX</u> | <u>DATE SAMPLED</u> | <u>DATE EXTRACTED</u> | <u>DATE ANALYZED</u> | <u>SAMPLE pH¹</u> |
|--------------------------|-----------------------------|--------------------------|-------------------------|---------------------------|--------------------------|----------------------------------|
| RB983001 | X | WATER | 08/13/96 | N/A | 08/24/96 | < 2 |
| RB983002 | 8 | WATER | 08/13/96 | N/A | 08/26/96 | < 2 |
| RB983003 | 9 | WATER | 08/13/96 | N/A | 08/24/96 | < 2 |
| RB983004 | 10 | WATER | 08/13/96 | N/A | 08/24/96 | < 2 |
| RB983005 | 12 | WATER | 08/13/96 | N/A | 08/24/96 | < 2 |
| RB983006 | 200 | WATER | 08/13/96 | N/A | 08/24/96 | < 2 |
| RB983007 | QQ | WATER | 08/13/96 | N/A | 08/24/96 | < 2 |
| RB983008 | W | WATER | 08/14/96 | N/A | 08/24/96 | < 2 |
| RB983009 | V | WATER | 08/14/96 | N/A | 08/24/96 | < 2 |
| RB983010 | Q | WATER | 08/14/96 | N/A | 08/26/96 | < 2 |
| RB983011 | 11 | WATER | 08/14/96 | N/A | 08/26/96 | < 2 |
| RB983012 | T | WATER | 08/14/96 | N/A | 08/26/96 | < 2 |
| RB983013 | UU | WATER | 08/14/96 | N/A | 08/26/96 | < 2 |
| RB983014 | HENKEL | WATER | 08/14/96 | N/A | 08/26/96 | < 2 |
| RB983015 | SS | WATER | 08/14/96 | N/A | 08/26/96 | < 2 |
| RB983016 | TT | WATER | 08/14/96 | N/A | 08/26/96 | < 2 |
| RB983017 | INF | WATER | 08/13/96 | N/A | 08/26/96 | < 2 |
| RB983017DL | INFDL | WATER | 08/13/96 | N/A | 08/26/96 | < 2 |
| RB983018 | EFF | WATER | 08/13/96 | N/A | 08/26/96 | < 2 |
| RB983019 | M6-EFF | WATER | 08/13/96 | N/A | 08/26/96 | < 2 |
| RB983020 | DISCHG | WATER | 08/13/96 | N/A | 08/26/96 | < 2 |
| RB983021 | M-1 | WATER | 08/13/96 | N/A | 08/26/96 | < 2 |
| RB983022 | TB-1 | WATER | 08/13/96 | N/A | 08/24/96 | < 2 |
| RB983023 | FB-1 | WATER | 08/14/96 | N/A | 08/24/96 | < 2 |
| RB983024 | M-2 | WATER | 08/14/96 | N/A | 08/24/96 | < 2 |
| VWB10824 | VWB10824 | WATER | N/A | N/A | 08/24/96 | N/A |
| VWB10826 | VWB10826 | WATER | N/A | N/A | 08/26/96 | N/A |

¹ Applies to samples designated for purgeable VOA analysis only.

Report of Analytical Results

Client Sample ID: X
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: R8983
 Lab Sample ID: R8983001

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 97 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: 8
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
 Lab Sample ID: RB983002

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 35 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 86 | %rec | |

(5908)

Q

Report of Analytical Results

Client Sample ID: 9
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: RB983
 Lab Sample ID: RB983003

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 3.0 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 97 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: 10
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: R8983
 Lab Sample ID: R8983004

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 24 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 90 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: 12
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: RB983
 Lab Sample ID: RB983005

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 87 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: 200
Sample Description: GRAB
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: RB983
Lab Sample ID: RB983006

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 29 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 96 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 83 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: QQ
Sample Description: GRAB
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: RB983
Lab Sample ID: RB983007

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 2.9 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 2.2 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 90 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: W
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: RB983
 Lab Sample ID: RB983008

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 9.4 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 1.4 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 85 | %rec | |

(5908)

(P)

0011

Report of Analytical Results

Client Sample ID: V
Sample Description: GRAB
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: R8983
Lab Sample ID: R8983009

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 12 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 100 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 86 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: Q
Sample Description: GRAB
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
Lab Sample ID: RB983010

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.84 | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.93 | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 85 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: 11
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
 Lab Sample ID: RB983011

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.83 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 17 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 81 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: T
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/26/96 (Monday)

Lab Reference No: R8983
 Lab Sample ID: R8983012

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 83 | %rec | |

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Report of Analytical Results

Client Sample ID: UU
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
 Lab Sample ID: RB983013

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 2.5 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 47 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 80 | %rec | |

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Report of Analytical Results

Client Sample ID: HENKEL
Sample Description: GRAB
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
Lab Sample ID: RB983014

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|----------------------|--------|-------|-----------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 9.2 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 82 | %rec | |

(5908)

2

Report of Analytical Results

Client Sample ID: SS
Sample Description: GRAB
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
Lab Sample ID: RB983015

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 2.3 | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 1.5 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 2.2 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 81 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: TT
Sample Description: GRAB
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
Lab Sample ID: RB983016

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 1.0 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 89 | %rec | |

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Report of Analytical Results

Client Sample ID: INF
Sample Description: GRAB/COMP
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
Lab Sample ID: RB983017

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 1.2 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 1.3 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 1.3 | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 6.3 | ug/L | 0.5 |
| Toluene | 108-88-3 | 12 | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 140 E | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 4.0 | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 37 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 103 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 84 | %rec | |

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CH2M Hill Analytical Services -- Redding
FORM I

Report of Analytical Results

Client Sample ID: INFDL
Sample Description: GRAB/COMP
Sample Matrix: Water
Dilution: 5.00

Date Collected: 08/13/96 (Tuesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
Lab Sample ID: RB983017DL

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 2.5 U | ug/L | 2.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 2.5 U | ug/L | 2.5 |
| 1,1-Dichloroethane | 75-34-3 | 2.5 U | ug/L | 2.5 |
| 1,2-Dichloroethane | 107-06-2 | 2.5 U | ug/L | 2.5 |
| Benzene | 71-43-2 | 2.5 U | ug/L | 2.5 |
| Tetrachloroethene | 127-18-4 | 4.5 D | ug/L | 2.5 |
| Toluene | 108-88-3 | 9.8 D | ug/L | 2.5 |
| Trichloroethene | 79-01-6 | 400 D | ug/L | 2.5 |
| Xylenes (Total) | XYLENES | 2.5 U | ug/L | 2.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 2.5 U | ug/L | 2.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 33 D | ug/L | 2.5 |
| Fluorobenzene - SS | 462-06-6 | 106 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 84 | %rec | |

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0021

Report of Analytical Results

Client Sample ID: EFF
Sample Description: GRAB
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
Lab Sample ID: RB983018

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 64 | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 12 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 103 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 84 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: M6-EFF
 Sample Description: GRAB/COMP
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
 Lab Sample ID: RB983019

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 19 | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 1.0 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 105 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 82 | %rec | |

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Report of Analytical Results

Client Sample ID: DISCHG
Sample Description: GRAB/COMP
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
Lab Sample ID: RB983020

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.77 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.63 | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 40 | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 2.5 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 105 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 82 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: M-1
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
 Lab Sample ID: RB983021

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.63 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.96 | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 61 | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 5.2 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 105 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 84 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: TB-1
Sample Description: QC
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/13/96 (Tuesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: RB983
Lab Sample ID: RB983022

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 101 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 91 | %rec | |

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Report of Analytical Results

Client Sample ID: FB-1
Sample Description: QC
Sample Matrix: Water
Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
Date Received: 08/15/96 (Thursday)
Date Extracted: None
Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: RB983
Lab Sample ID: RB983023

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 89 | %rec | |

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Report of Analytical Results

Client Sample ID: M-2
 Sample Description: GRAB
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: 08/14/96 (Wednesday)
 Date Received: 08/15/96 (Thursday)
 Date Extracted: None
 Date Analyzed: 08/26/96 (Monday)

Lab Reference No: RB983
 Lab Sample ID: RB983024

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.81 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 17 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 87 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: VWB10824
 Sample Description: None
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: None
 Date Received: None
 Date Extracted: None
 Date Analyzed: 08/24/96 (Saturday)

Lab Reference No: LABQC
 Lab Sample ID: VWB10824

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| 1,4-Dichlorobutane - SS | 110-56-5 | 92 | %rec | |

(5908)

Report of Analytical Results

Client Sample ID: VWB10826
 Sample Description: None
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: None
 Date Received: None
 Date Extracted: None
 Date Analyzed: 08/26/96 (Monday)

Lab Reference No: LABQC
 Lab Sample ID: VWB10826

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 105 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 83 | %rec | |

(5908)

CHAIN OF CUSTODY DOCUMENTATION

Barr

Chain of Custody A

Engineering Company

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number

23 / 27 - 169 PZS 002

No 20407

Number of Containers/Preservative

RB983

Project Manager:

CMM

Project Contact:

MSH

Laboratory:

QAL-CA

Remarks/
Analysis Required: Pg 1 of 2

| No 20407 | | Collection | | Matrix | | | | | Type | | Total No | Remarks/ Analysis Required: Pg 1 of 2 | | | | | | | | | | | | | | |
|-----------------------|--------|------------|------|--------|------|-------|------|-------|------|-----------|----------|--|-----------|-----------|-----------|-----------|-------------|-------------|-----------|-----------|------------------------|-------------|--------|-----------|-----------|-----------------|
| Sample Identification | | Date | Time | Water | Soil | Other | Grab | Comp. | QC | Volatiles | | | Volatiles | Semivolat | Total Met | Dissolved | General (C) | Cyanide (N) | Nutrients | Oil and C | TOC (H ₂ S) | Sulfide (Z) | Dioxin | Whirlpak/ | Total Phe | |
| ① | X | 8/13/96 | | X | | | X | | | | 3 | | | | | | | | | | | | | | 3 | TCE- METHOD 601 |
| ② | 8 | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ③ | 9 | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ④ | 10 | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑤ | 12 | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑥ | 200 | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑦ | QQ | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑧ | W | 8/14/96 | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑨ | V | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑩ | Q | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑪ | 11 | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑫ | T | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑬ | UU | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑭ | HENKEL | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑮ | SS | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |
| ⑯ | TT | | | | | | | | | | 3 | | | | | | | | | | | | | | 3 | |

QAL / RECEIVING RECEIPT

| | | |
|-----------|-----|--------------|
| CC LEVEL | ICE | yes |
| SOC | yes | TEMP 40 |
| CERT SEAL | yes | PH 7.2 |
| LOGS | UPS | FED-EX OTHER |

QAL / PENDING RECEIPT

| | |
|---------------|--------------|
| GC LEVEL | ICE YES |
| SOC YES | TEMP 40C |
| CUST SEAL YES | PH 7.2 |
| LHS LPS | FED-EX OTHER |

Sampled By:

SDI

Relinquished By:

SDI

Date

8-14-96

Time

1630

Received by Lab:

Andy Barron

Date

8/15/96

Time

0915

Remarks:

Samples Shipped VIA ☐ Air Freight ☒ Fed. Exp. ☐ Sampler ☐ Other

Air Bill Number:

122 3871 693

Barr

Chain of Custody A

Engineering Company

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number

23, 27, 16, 9, P, Z, S, 0, 0, 2

No 20406

Matrix

Type

Sample
Identification

Collection

Date

Time

Water

Soil

Other

Grab

Comp.

QC

Volatile Organic (Unpres.)

Volatile Organic (Pres.)

Semivolatile Organic

Total Metals (HNO₃)Dissolved Metals (HNO₃)

General (Unpreserved)

Cyanide (N₂O₄, Asc. Acid)Nutrients (H₂SO₄)Oil and Grease (H₂SO₄)TOC (H₂SO₄)

Sulfide (Zn Acetate)

Dioxin

Whirlpak/Bacteria

Total Phenol (H₂SO₄)

Total No. Of Containers

Project Manager:

CMM

Project Contact:

MSH

Laboratory:

QAL-CA

Remarks/
Analysis Required:

B-202

17

X. INF.

8/13/96

X

X

X

3

3

TABLE 1, LIST 2 VOC'S

18

X. EFF.

X

3

3

19

X. M6-EFF.

X

X

3

3

20

X. DISCHG.

X

X

3

3

21

X. M-1

X

3

3

22

X. TB-1

X

3

3

7.

8.

9.

10.

23

X. FB-1

8/14/96

X

X

3

3

TCR - METHOD 601

24

X. M-2

X

X

3

3

TCE - METHOD 601

13.

14.

15.

16.

Sampled By:

SDI

Relinquished By:

SDI

Date

8/14/96

Time

1630

Received by Lab:

Cindy Barber

Date

8/15/96

Time

0945

Relinquished By:

Samples Shipped VIA

☐ Air Freight☒ Fed. Exp.☐ Sampler☐ Other

Received by Lab:

Air Bill Number:

122 2871 693

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

TABLE 1

2B983

LIST 2 VOLATILE ORGANIC COMPOUNDS

1,1-Dichloroethane
 1,2-Dichloroethane
 1,2-Dichloroethylene, cis
 1,2-Dichloroethylene, trans
 1,1,2,2-Tetrachloroethane
 Tetrachloroethylene
 1,1,1-Trichloroethane
 Trichloroethylene
 Benzene
 Toluene
 Xylenes

QAL Reference Number RB983

Project / Client BARR ENG

pH LOG

By Blut

Date 8/16/96

| QAL Sample No. | HNO3 pH < 2 | H2SO4 pH < 2 | ZnAc2/ NaOH pH > 9 | NaOH pH > 12 | HCl pH < 2 | | |
|----------------------|----------------|-----------------|--------------------------|-----------------|---------------|--|--|
| -001 | | | | | OK | | |
| -002 | | | | | | | |
| -003 | | | | | | | |
| -004 | | | | | | | |
| -005 | | | | | | | |
| -006 | | | | | | | |
| -007 | | | | | | | |
| -008 | | | | | | | |
| -009 | | | | | | | |
| -010 | | | | | | | |
| -011 | | | | | | | |
| -012 | | | | | | | |
| -013 | | | | | | | |
| -014 | | | | | | | |
| -015 | | | | | | | |
| -016 | | | | | | | |
| -017 | | | | | | | |
| -018 | | | | | | | |
| -019 | | | | | | | |
| -020 | | | | | | | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |



Project Number: _____

Date: 7-23-96

Country (if outside USA): _____

Time Sent: 6:00 AM ☐ PM ☒

FAX RECEIVED

FAX Transmission Form
FOR IMMEDIATE DELIVERY

JUL 24 1996

To/Firm: Michelle HermanSpecial Instructions: TO BARR
ENGINEERINGBarr Eng.From: Brian Morris

Fax No.: _____

Employee No.: _____

Verification No.: _____

Total No. of Pages (Including this page): 13

If you do not receive ALL OF THE PAGES or if any of the pages DID
NOT TRANSMIT CLEARLY, please call (916) 244-5227. Thank You.

Message:

RB809. Results

COPY

QAL
Redding
Laboratory5090 Caterpillar Road
Redding, CA 96003-1412(916) 244-5227
FAX (916) 244-4109

Better Chemistry for a Better Environment



Report of Analytical Results

Client Sample ID: INF
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 07/02/96 (Tuesday)
Date Received: 07/03/96 (Wednesday)
Date Extracted: None
Date Analyzed: 07/11/96 (Thursday)

Lab Reference No: R8809
Lab Sample ID: R8809001

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 1.1 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 1.2 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethane | 127-18-4 | 6.0 | ug/L | 0.5 |
| Toluene | 108-88-3 | 5.4 | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 230 E | ug/L | 0.5 |
| Xylenes (Total) | -XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethane | 156-60-5 | 0.63 | ug/L | 0.5 |
| cis-1,2-Dichloroethane | 156-59-2 | 47 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 99 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 98 | %rec | |

(5871)

Quality Analytical Laboratories (QAL), Inc. -- Redding
FORM I

Report of Analytical Results

Client Sample ID: INFOL
Sample Description: None
Sample Matrix: Water
Dilution: 5.00

Date Collected: 07/02/96 (Tuesday)
Date Received: 07/03/96 (Wednesday)
Date Extracted: None
Date Analyzed: 07/16/96 (Tuesday)

Lab Reference No: R8809
Lab Sample ID: R88090010L

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 2 U | ug/L | 2 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 2 U | ug/L | 2 |
| 1,1-Dichloroethane | 75-34-3 | 2 U | ug/L | 2 |
| 1,2-Dichloroethane | 107-06-2 | 2 U | ug/L | 2 |
| Benzene | 71-43-2 | 2 U | ug/L | 2 |
| Tetrachloroethene | 127-18-4 | 4.8 | ug/L | 2 |
| Toluene | 108-88-3 | 2 U | ug/L | 2 |
| Trichloroethene | 79-01-6 | 390 | ug/L | 2 |
| Xylenes (Total) | XYLENES | 2 U | ug/L | 2 |
| trans-1,2-Dichloroethene | 156-60-5 | 2 U | ug/L | 2 |
| cis-1,2-Dichloroethene | 156-59-2 | 41 | ug/L | 2 |
| Fluorobenzene - SS | 462-06-6 | 95 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 104 | %rec | |

(5871)

Quality Analytical Laboratories (QAL), Inc. -- Redding
FORM I

Report of Analytical Results

Client Sample ID: EFF
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 07/02/96 (Tuesday)
Date Received: 07/03/96 (Wednesday)
Date Extracted: None
Date Analyzed: 07/11/96 (Thursday)

Lab Reference No: R8809
Lab Sample ID: R8809002

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 1.0 | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 96 | %rec | |
| 1,4-Dichlorobutane - SS | 110-54-5 | 97 | %rec | |

(5871)

Report of Analytical Results

Client Sample ID: M6-EFF
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 07/02/96 (Tuesday)
Date Received: 07/03/96 (Wednesday)
Date Extracted: None
Date Analyzed: 07/11/96 (Thursday)

Lab Reference No: R8809
Lab Sample ID: R8809003

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| SG VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.85 | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 21 | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 456-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 1.0 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 97 | ug/L | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 99 | ug/L | |

(5871)

Quality Analytical Laboratories (QAL), Inc. -- Redding
FORM I

Report of Analytical Results

Client Sample ID: DSCMG
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 07/02/96 (Tuesday)
Date Received: 07/03/96 (Wednesday)
Date Extracted: None
Date Analyzed: 07/11/96 (Thursday)

Lab Reference No: R8809
Lab Sample ID: R8809004

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.62 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 1.2 | ug/L | 0.5 |
| Toluene | 105-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 77 | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 5.7 | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 95 | mg/L | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 94 | mg/L | |

(5871)

Quality Analytical Laboratories (QAL), Inc. -- Redding
FORM I

Report of Analytical Results

Client Sample ID: M-1
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 07/02/96 (Tuesday)
Date Received: 07/03/96 (Wednesday)
Date Extracted: None
Date Analyzed: 07/11/96 (Thursday)

Lab Reference No: R8809
Lab Sample ID: R8809005

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|----------------------|--------|-------|-----------------|
| SC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 1.2 | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 1.2 | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 6.6 | ug/L | 0.5 |
| Toluene | 108-88-3 | 6.1 | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 210 E | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.55 | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 31 | ug/L | 0.5 |
| Fluorobenzene - SS | 452-06-6 | 102 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 92 | %rec | |

(5871)

Quality Analytical Laboratories (QAL), Inc. -- Redding
FORM I

Report of Analytical Results

Client Sample ID: M-10L
Sample Description: None
Sample Matrix: Water
Dilution: 5.00

Date Collected: 07/02/96 (Tuesday)
Date Received: 07/03/96 (Wednesday)
Date Extracted: None
Date Analyzed: 07/16/96 (Tuesday)

Lab Reference No: R8809
Lab Sample ID: R8809005DL

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 2 U | ug/L | 2 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 2 U | ug/L | 2 |
| 1,1-Dichloroethane | 75-34-3 | 2 U | ug/L | 2 |
| 1,2-Dichloroethane | 107-06-2 | 2 U | ug/L | 2 |
| Benzene | 71-43-2 | 2 U | ug/L | 2 |
| Tetrachloroethene | 127-18-4 | 5.1 | ug/L | 2 |
| Toluene | 108-88-3 | 2 U | ug/L | 2 |
| Trichloroethene | 79-01-6 | 400 | ug/L | 2 |
| Xylenes (Total) | XYLENES | 2 U | ug/L | 2 |
| trans-1,2-Dichloroethene | 156-60-5 | 2 U | ug/L | 2 |
| cis-1,2-Dichloroethene | 156-59-2 | 24 | ug/L | 2 |
| Fluorobenzene - SS | 462-06-6 | 93 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 105 | %rec | |

(5871)

Report of Analytical Results

Client Sample ID: FB-1
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 07/02/96 (Tuesday)
Date Received: 07/03/96 (Wednesday)
Date Extracted: None
Date Analyzed: 07/11/96 (Thursday)

Lab Reference No: R8809
Lab Sample ID: R8809006

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | .97 | %rec | |
| 1,4-Dichlorobutene - SS | 110-56-5 | .86 | %rec | |

(5871)

Quality Analytical Laboratories (QAL), Inc. -- Redding
FORM I

Report of Analytical Results

Client Sample ID: VWB10711
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: None
Date Received: None
Date Extracted: None
Date Analyzed: 07/11/96 (Thursday)

Lab Reference No: LABQC
Lab Sample ID: VWB10711

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 96 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 96 | %rec | |

(5871)

Quality Analytical Laboratories (QAL), Inc. -- Redding
FORM I

Report of Analytical Results

Client Sample ID: VW810716
 Sample Description: None
 Sample Matrix: Water
 Dilution: 1.00

Date Collected: None
 Date Received: None
 Date Extracted: None
 Date Analyzed: 07/16/96 (Tuesday)

Lab Reference No: LABQC
 Lab Sample ID: VW810716

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.5 U | ug/L | 0.5 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.5 U | ug/L | 0.5 |
| 1,1-Dichloroethane | 75-34-3 | 0.5 U | ug/L | 0.5 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 U | ug/L | 0.5 |
| Benzene | 71-43-2 | 0.5 U | ug/L | 0.5 |
| Tetrachloroethene | 127-18-4 | 0.5 U | ug/L | 0.5 |
| Toluene | 108-88-3 | 0.5 U | ug/L | 0.5 |
| Trichloroethene | 79-01-6 | 0.5 U | ug/L | 0.5 |
| Xylenes (Total) | XYLENES | 0.5 U | ug/L | 0.5 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.5 U | ug/L | 0.5 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.5 U | ug/L | 0.5 |
| Fluorobenzene - SS | 462-06-6 | 98. | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 107. | %rec | |

(5871)

Quality Analytical Laboratories (QAL), Inc. -- Redding
 FORM I

Report of Analytical Results

Client Sample ID: EFFMS
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 07/02/96 (Tuesday)
Date Received: 07/03/96 (Wednesday)
Date Extracted: None
Date Analyzed: 07/11/96 (Thursday)

Lab Reference No: R8809
Lab Sample ID: R8809002MS

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 102 | %rec | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 107 | %rec | |
| 1,1-Dichloroethane | 75-34-3 | 95 | %rec | |
| 1,2-Dichloroethane | 107-06-2 | 103 | %rec | |
| Benzene | 71-43-2 | 101 | %rec | |
| Tetrachloroethene | 127-18-4 | 97 | %rec | |
| Toluene | 108-88-3 | 100 | %rec | |
| Trichloroethene | 79-01-6 | 101 | %rec | |
| Xylenes (Total) | XYLENES | 102 | %rec | |
| trans-1,2-Dichloroethene | 156-60-5 | 102 | %rec | |
| cis-1,2-Dichloroethene | 156-59-2 | 105 | %rec | |
| Fluorobenzene - SS | 462-06-6 | 96 | %rec | |
| 1,4-Dichlorobutane - SS | 110-56-9 | 99 | %rec | |

(5871)

Quality Analytical Laboratories (QAL), Inc. -- Redding
FORM 1

Report of Analytical Results

Client Sample ID: EFFMSD
Sample Description: None
Sample Matrix: Water
Dilution: 1.00

Date Collected: 07/02/96 (Tuesday)
Date Received: 07/03/96 (Wednesday)
Date Extracted: None
Date Analyzed: 07/11/96 (Thursday)

Lab Reference No: R8809
Lab Sample ID: R8809002MSD

| Analytical Parameter | CAS or Storet Number | Result | Units | Reporting Level |
|---------------------------|-------------------------|--------|-------|--------------------|
| GC VOLATILES | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 100 | Xrec | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 113 | Xrec | |
| 1,1-Dichloroethane | 75-34-3 | 95 | Xrec | |
| 1,2-Dichloroethane | 107-06-2 | 100 | Xrec | |
| Benzene | 71-43-2 | 101 | Xrec | |
| Tetrachloroethene | 127-18-4 | 98 | Xrec | |
| Toluene | 108-88-3 | 97 | Xrec | |
| Trichloroethene | 79-01-6 | 100 | Xrec | |
| Xylenes (Total) | XYLENES | 100 | Xrec | |
| trans-1,2-Dichloroethene | 156-60-5 | 100 | Xrec | |
| cis-1,2-Dichloroethene | 156-59-2 | 98 | Xrec | |
| Fluorobenzene - SS | 462-06-6 | 92 | Xrec | |
| 1,4-Dichlorobutane - SS | 110-56-5 | 98 | Xrec | |

(5871)



QUALITY ANALYTICAL
LABORATORIES, INC.

March 26, 1996

Ch
RECEIVED

MAR 29 1996

BARR
ENGINEERING CO.

Ms. Marti Harding-Smith
Barr Engineering Company
8300 Norman Center Dr.
Minneapolis, MN 55437-1026

RE: Analytical Data for
Barr Engineering Company

QAL Reference
RB160

Dear Ms. Harding-Smith:

PROJECT # 23/27-169P2S002

On March 12, 1996, QAL, Inc. received samples with a request for analysis. The analytical results and associated quality control data are enclosed.

It is our policy to store your samples for 30 days from the date of this letter. If extended storage is required, special arrangements can be accommodated upon early notification. The disposition of samples identified as hazardous will require special handling and you will be contacted if necessary.

QAL, Inc. appreciates your business and looks forward to serving you again. If you have any questions concerning your report or need any additional information, please call me at (916) 244-5227.

Sincerely,

Wayne Scott

Wayne Scott
Project Manager/Client Services

TABLE OF CONTENTS

QAL Lab Reference No.: RB160
Level 1

| | Page <u>No.</u> |
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| Organic Data Qualifiers | i |
| Organic Sample ID Qualifiers | ii |
| Sample Identification Cross-Reference | iii |
| GC PURGEABLE HALOCARBONS/AROMATICS | 1 |
| Case narrative | 2 |
| Sample results | 4 |
| Chain of Custody Documentation | 15 |

Organic Data Qualifiers

- A -- This qualifier indicates that a TIC is a suspected aldol-condensation product.
- B-- This flag is used when the analyte is found in the associated blank as well as the sample. This notation indicates possible blank contamination and suggests that the data user evaluate these compounds and their amounts carefully.
- C-- The "C" flag indicates the presence of this compound has been confirmed by the GC/MS analysis.
- D-- This qualifier is used for all compounds identified in an analysis at a secondary dilution factor. "D" qualifiers are used only for the samples reported at more than one dilution factor.
- E-- This flag indicates that the value reported exceeds the linear calibration range for that compound. Therefore, the sample should be reanalyzed at the appropriate dilution. The "E" qualified amount is an estimated concentration, and the results of the dilution will be reported on a separate Form I.
- I-- This qualifier indicates that the reporting limit adjacent to the "I" qualifier has been raised. It is used when chromatographic interference prohibits detection of a compound at a level below the concentration expressed on the Form I.
- J-- Indicates an estimated value. It is used when the data indicates the presence of a target compound below the reporting limit or the presence of a Tentatively Identified Compound (TIC)
- N-- This qualifier indicates presumptive evidence of a compound. This flag is only used for Tentatively Identified Compounds (TIC), where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic characterization of a TIC, such as chlorinated hydrocarbon, the "N" qualifier is not used.
- P-- This qualifier is used for pesticide/Aroclor target analytes when there is a greater than 25% difference for detected concentrations between the two columns. The lower of the two values is reported on Form I and flagged with a "P".
- U-- Indicates the compound was analyzed for but not detected. The number adjacent to the "U" qualifier indicates the reporting limit for that compound. The reporting limit can vary from sample to sample depending on dilution factors or percent moisture adjustments when indicated.

Organic Sample ID Qualifiers

The qualifiers that may be appended to the Lab Sample ID and/or the Client Sample ID for organic analysis are defined below:

- DL --** Diluted reanalysis . Indicates that the results were determined in an analysis of a secondary dilution of a sample or extract. The "DL" suffix may be followed by a digit to indicate multiple dilutions of the sample or extract. The results of more than one diluted reanalyses may be reported.
- MS--** Matrix spike (may be followed by a digit to indicate multiple matrix spikes within a sample set).
- MSD--**Matrix spike duplicate (may be followed by a digit to indicate multiple matrix spikes within a sample set).
- R--** Reanalysis. The extract was reanalyzed without re-extraction. The "R" is not used if the sample was also re-extracted. May be followed by a digit to indicate multiple reanalyses of the sample at the same dilution.
- RE--** Re-extraction analysis. The sample was re-extracted and reanalyzed. May be followed by a digit to indicate multiple re-extracted analyses of the same sample at the same dilution.

Sample ID Cross-reference Table

| QAL, Inc. Lab Sample ID | Client Sample ID | Collect Date | Sample Matrix | Additional Description |
|---|---------------------|-----------------|---------------|------------------------|
| FS = Field Sample; MSD = Matrix Spike Duplicate; MSO = Matrix Spike, Organic; TB = Trip Blank | | | | |
| RB160001 | FS INF | 03/11/96 | Water | |
| RB160002 | FS EFF | 03/11/96 | Water | |
| RB160003 | FS M6-EFF | 03/11/96 | Water | |
| RB160004 | FS DSCNG | 03/11/96 | Water | |
| RB160005 | FS M-1 | 03/11/96 | Water | |
| RB160006 | TB TB-1 | 03/11/96 | Water | |

The above lab sample ID's and cross reference information apply to samples as received by the laboratory. Modifiers to the lab sample ID may be added for internal tracking purposes. Any modified sample ID will be reflected in the appropriate case narrative only.

GC PURGEABLE HALOCARBONS/AROMATICS

**CASE NARRATIVE
GC PURGEABLE HALOCARBONS/AROMATICS**

QAL Lab Reference No./SDG.: RB160

Project: Barr Engineering

I. RECEIPT

No exceptions were encountered unless a Sample Receipt Exception Report is attached to the Chain-of-Custody included with this data package.

II. HOLDING TIMES

A. Sample Preparation: All holding times were met.

B. Sample Analysis: All holding times were met.

III. METHOD

Preparation: N/A

Cleanup: N/A

Analysis: EPA 601/602 (MOD)

IV. PREPARATION

Sample preparation proceeded normally.

V. ANALYSIS

A. Calibration : All acceptance criteria were met.

B. Blanks: All acceptance criteria were met.

C. Surrogates: All acceptance criteria were met.

D. Spikes: All acceptance criteria were met.

E. Samples: Due to the concentration of target analytes, samples RB160001 (INF) and RB160005 (M-1) were reanalyzed on a diluted basis in order to obtain a detector response within the linear calibration range of the instrument. The results of all analyses are included for your information. Reporting limits have been adjusted accordingly.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and QAL, Inc., both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

SIGNED: Brian Geers

Brian Geers

Manager, Organics Department

DATE: 3/25/96

CASE NARRATIVE
Addendum

Sample Information

| <u>LAB</u> <u>SAMPLE ID</u> | <u>CLIENT</u> <u>SAMPLE ID</u> | <u>SAMPLE</u> <u>MATRIX</u> | <u>DATE</u> <u>SAMPLED</u> | <u>DATE</u> <u>EXTRACTED</u> | <u>DATE</u> <u>ANALYZED</u> | <u>SAMPLE</u> <u>pH</u> ¹ |
|--------------------------------|-----------------------------------|--------------------------------|-------------------------------|---------------------------------|--------------------------------|---|
| RB160001 | INF | WATER | 03/11/96 | N/A | 03/17/96 | < 2 |
| RB160001DL | INFDL | WATER | 03/11/96 | N/A | 03/18/96 | < 2 |
| RB160002 | EFF | WATER | 03/11/96 | N/A | 03/17/96 | < 2 |
| RB160003 | M6-EFF | WATER | 03/11/96 | N/A | 03/17/96 | < 2 |
| RB160004 | DSCHG | WATER | 03/11/96 | N/A | 03/17/96 | < 2 |
| RB160005 | M-1 | WATER | 03/11/96 | N/A | 03/17/96 | < 2 |
| RB160005DL | M-1DL | WATER | 03/11/96 | N/A | 03/18/96 | < 2 |
| RB160006 | TB-1 | WATER | 03/11/96 | N/A | 03/17/96 | < 2 |
| RB160800MS | MATRIX SPIKE | WATER | 03/11/96 | N/A | 03/17/96 | < 2 |
| RB160800MSD | MS DUPLICATE | WATER | 03/11/96 | N/A | 03/17/96 | < 2 |
| VWB10317 | VWB10317 | WATER | N/A | N/A | 03/17/96 | N/A |
| VWB10318 | VWB10318 | WATER | N/A | N/A | 03/18/96 | N/A |

¹ Applies to samples designated for purgeable VOA analysis only.

METHOD: 601/602(MOD)
PURGEABLE HALOCARBONS/AROMATICS

Client: Barr Engineering
Project: Barr Engineering Company
Client Sample ID: INF
Sample Matrix: Water
Dilution Factor: 1.0

Lab Sample ID: RB160001
Date Sampled: 03/11/96
Date Received: 03/12/96
Date Extracted: N/A
Date Analyzed: 03/17/96

| Compound | Reporting Limit | Sample Result | Units |
|---------------------------|--------------------|------------------|--------|
| 1,1-Dichloroethane | 0.50 | 1.5 | ug/L |
| trans-1,2-Dichloroethene | 0.50 | U | ug/L |
| 1,2-Dichloroethane | 0.50 | U | ug/L |
| 1,1,1-Trichloroethane | 0.50 | 1.1 | ug/L |
| Trichloroethene | 0.50 | 210 E | ug/L |
| 1,1,2,2-Tetrachloroethane | 0.50 | U | ug/L |
| Tetrachloroethene | 0.50 | 4.9 | ug/L |
| cis-1,2-Dichloroethene | 0.50 | 33 | ug/L |
| Benzene | 0.50 | 1.0 | ug/L |
| Toluene | 0.50 | 7.4 | ug/L |
| Xylenes (total) | 0.50 | 3.0 | ug/L |
| 1,4-Dichlorobutane-SS | | 99 | % rec. |
| Fluorobenzene-SS | | 95 | % rec. |

U = Not detected above the reporting limit.

SS = Surrogate Standard reported as percent recovery.

E = Value reported exceeds linear calibration range; estimated concentration.

Comments:

Approved by: 

FORM I

kdl.040

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0004

METHOD: 601/602(MOD)
PURGEABLE HALOCARBONS/AROMATICS

Client: Barr Engineering
Project: Barr Engineering Company
Client Sample ID: INFDL
Sample Matrix: Water
Dilution Factor: 5.0

Lab Sample ID: RB160001DL
Date Sampled: 03/11/96
Date Received: 03/12/96
Date Extracted: N/A
Date Analyzed: 03/18/96

| Compound | Reporting Limit | Sample Result | Units |
|---------------------------|-----------------|---------------|--------|
| 1,1-Dichloroethane | 2.5 | U | ug/L |
| trans-1,2-Dichloroethene | 2.5 | U | ug/L |
| 1,2-Dichloroethane | 2.5 | U | ug/L |
| 1,1,1-Trichloroethane | 2.5 | U | ug/L |
| Trichloroethene | 2.5 | 360 D | ug/L |
| 1,1,2,2-Tetrachloroethane | 2.5 | U | ug/L |
| Tetrachloroethene | 2.5 | 3.6 | ug/L |
| cis-1,2-Dichloroethene | 2.5 | 29 | ug/L |
| Benzene | 2.5 | U | ug/L |
| Toluene | 2.5 | 6.9 | ug/L |
| Xylenes (total) | 2.5 | 2.6 | ug/L |
| 1,4-Dichlorobutane-SS | | 98 | % rec. |
| Fluorobenzene-SS | | 94 | % rec. |

U = Not detected above the reporting limit.
SS = Surrogate Standard reported as percent recovery.
D = Compound identified for accurate quantification during diluted reanalysis.

Comments:

Approved by: 

FORM I

kdl.040

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0005

METHOD: 601/602 (MOD)
PURGEABLE HALOCARBONS/AROMATICS

Client: Barr Engineering
Project: Barr Engineering Company
Client Sample ID: EFF
Sample Matrix: Water
Dilution Factor: 1.0

Lab Sample ID: RB160002
Date Sampled: 03/11/96
Date Received: 03/12/96
Date Extracted: N/A
Date Analyzed: 03/17/96

| Compound | Reporting Limit | Sample Result | Units |
|---------------------------|-----------------|---------------|--------|
| 1,1-Dichloroethane | 0.50 | U | ug/L |
| trans-1,2-Dichloroethene | 0.50 | U | ug/L |
| 1,2-Dichloroethane | 0.50 | U | ug/L |
| 1,1,1-Trichloroethane | 0.50 | U | ug/L |
| Trichloroethene | 0.50 | 38 | ug/L |
| 1,1,2,2-Tetrachloroethane | 0.50 | U | ug/L |
| Tetrachloroethene | 0.50 | U | ug/L |
| cis-1,2-Dichloroethene | 0.50 | 8.4 | ug/L |
| Benzene | 0.50 | U | ug/L |
| Toluene | 0.50 | U | ug/L |
| Xylenes (total) | 0.50 | U | ug/L |
| 1,4-Dichlorobutane-SS | | 104 | % rec. |
| Fluorobenzene-SS | | 96 | % rec. |

U = Not detected above the reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by: 

FORM I

kdl.040

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0006

METHOD: 601/602 (MOD)
PURGEABLE HALOCARBONS/AROMATICS

Client: Barr Engineering
Project: Barr Engineering Company
Client Sample ID: M6-EFF
Sample Matrix: Water
Dilution Factor: 1.0

Lab Sample ID: RB160003
Date Sampled: 03/11/96
Date Received: 03/12/96
Date Extracted: N/A
Date Analyzed: 03/17/96

| Compound | Reporting Limit | Sample Result | Units |
|---------------------------|-----------------|---------------|--------|
| 1,1-Dichloroethane | 0.50 | U | ug/L |
| trans-1,2-Dichloroethene | 0.50 | U | ug/L |
| 1,2-Dichloroethane | 0.50 | U | ug/L |
| 1,1,1-Trichloroethane | 0.50 | U | ug/L |
| Trichloroethene | 0.50 | 18 | ug/L |
| 1,1,2,2-Tetrachloroethane | 0.50 | U | ug/L |
| Tetrachloroethene | 0.50 | U | ug/L |
| cis-1,2-Dichloroethene | 0.50 | 1.1 | ug/L |
| Benzene | 0.50 | U | ug/L |
| Toluene | 0.50 | U | ug/L |
| Xylenes (total) | 0.50 | U | ug/L |
| 1,4-Dichlorobutane-SS | | 107 | % rec. |
| Fluorobenzene-SS | | 95 | % rec. |

U = Not detected above the reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by: 

FORM I

kdl.040

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0007

METHOD: 601/602 (MOD)
PURGEABLE HALOCARBONS/AROMATICS

Client: Barr Engineering
Project: Barr Engineering Company
Client Sample ID: DSCHG
Sample Matrix: Water
Dilution Factor: 1.0

Lab Sample ID: RB160004
Date Sampled: 03/11/96
Date Received: 03/12/96
Date Extracted: N/A
Date Analyzed: 03/17/96

| Compound | Reporting Limit | Sample Result | Units |
|---------------------------|--------------------|------------------|--------|
| 1,1-Dichloroethane | 0.50 | U | ug/L |
| trans-1,2-Dichloroethene | 0.50 | U | ug/L |
| 1,2-Dichloroethane | 0.50 | U | ug/L |
| 1,1,1-Trichloroethane | 0.50 | 0.53 | ug/L |
| Trichloroethene | 0.50 | 63 | ug/L |
| 1,1,2,2-Tetrachloroethane | 0.50 | U | ug/L |
| Tetrachloroethene | 0.50 | 0.76 | ug/L |
| cis-1,2-Dichloroethene | 0.50 | 3.0 | ug/L |
| Benzene | 0.50 | U | ug/L |
| Toluene | 0.50 | U | ug/L |
| Xylenes (total) | 0.50 | U | ug/L |
| 1,4-Dichlorobutane-SS | | 104 | % rec. |
| Fluorobenzene-SS | | 96 | % rec. |

U = Not detected above the reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by: 

FORM I

kdl.040

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0008

METHOD: 601/602 (MOD)
PURGEABLE HALOCARBONS/AROMATICS

Client: Barr Engineering
Project: Barr Engineering Company
Client Sample ID: M-1
Sample Matrix: Water
Dilution Factor: 1.0

Lab Sample ID: RB160005
Date Sampled: 03/11/96
Date Received: 03/12/96
Date Extracted: N/A
Date Analyzed: 03/17/96

| Compound | Reporting Limit | Sample Result | Units |
|---------------------------|-----------------|---------------|--------|
| 1,1-Dichloroethane | 0.50 | 1.6 | ug/L |
| trans-1,2-Dichloroethene | 0.50 | 0.52 | ug/L |
| 1,2-Dichloroethane | 0.50 | U | ug/L |
| 1,1,1-Trichloroethane | 0.50 | 1.1 | ug/L |
| Trichloroethene | 0.50 | 220 E | ug/L |
| 1,1,2,2-Tetrachloroethane | 0.50 | U | ug/L |
| Tetrachloroethene | 0.50 | 5.6 | ug/L |
| cis-1,2-Dichloroethene | 0.50 | 41 | ug/L |
| Benzene | 0.50 | 1.0 | ug/L |
| Toluene | 0.50 | 6.8 | ug/L |
| Xylenes (total) | 0.50 | 3.0 | ug/L |
| 1,4-Dichlorobutane-SS | | 109 | % rec. |
| Fluorobenzene-SS | | 96 | % rec. |

U = Not detected above the reporting limit.
SS = Surrogate Standard reported as percent recovery.
E = Value reported exceeds linear calibration range; estimated concentration.

Comments:

Approved by: 

FORM I

kdl.040

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0009

METHOD: 601/602 (MOD)
PURGEABLE HALOCARBONS/AROMATICS

Client: Barr Engineering
Project: Barr Engineering Company
Client Sample ID: M-1DL
Sample Matrix: Water
Dilution Factor: 5.0

Lab Sample ID: RB160005DL
Date Sampled: 03/11/96
Date Received: 03/12/96
Date Extracted: N/A
Date Analyzed: 03/18/96

| Compound | Reporting Limit | Sample Result | Units |
|---------------------------|-----------------|---------------|--------|
| 1,1-Dichloroethane | 2.5 | U | ug/L |
| trans-1,2-Dichloroethene | 2.5 | U | ug/L |
| 1,2-Dichloroethane | 2.5 | U | ug/L |
| 1,1,1-Trichloroethane | 2.5 | U | ug/L |
| Trichloroethene | 2.5 | 380 D | ug/L |
| 1,1,2,2-Tetrachloroethane | 2.5 | U | ug/L |
| Tetrachloroethene | 2.5 | 3.6 | ug/L |
| cis-1,2-Dichloroethene | 2.5 | 34 | ug/L |
| Benzene | 2.5 | U | ug/L |
| Toluene | 2.5 | 6.0 | ug/L |
| Xylenes (total) | 2.5 | U | ug/L |
| 1,4-Dichlorobutane-SS | | 106 | % rec. |
| Fluorobenzene-SS | | 94 | % rec. |

U = Not detected above the reporting limit.

SS = Surrogate Standard reported as percent recovery.

D = Compound identified for accurate quantification during diluted reanalysis.

Comments:

Approved by: 

FORM I

kdl.040

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0010

METHOD: 601/602 (MOD)
PURGEABLE HALOCARBONS/AROMATICS

Client: Barr Engineering
Project: Barr Engineering Company
Client Sample ID: TB-1
Sample Matrix: Water
Dilution Factor: 1.0

Lab Sample ID: RB160006
Date Sampled: 03/11/96
Date Received: 03/12/96
Date Extracted: N/A
Date Analyzed: 03/17/96

| Compound | Reporting Limit | Sample Result | Units |
|---------------------------|--------------------|------------------|--------|
| 1,1-Dichloroethane | 0.50 | U | ug/L |
| trans-1,2-Dichloroethene | 0.50 | U | ug/L |
| 1,2-Dichloroethane | 0.50 | U | ug/L |
| 1,1,1-Trichloroethane | 0.50 | U | ug/L |
| Trichloroethene | 0.50 | U | ug/L |
| 1,1,2,2-Tetrachloroethane | 0.50 | U | ug/L |
| Tetrachloroethene | 0.50 | U | ug/L |
| cis-1,2-Dichloroethene | 0.50 | U | ug/L |
| Benzene | 0.50 | U | ug/L |
| Toluene | 0.50 | U | ug/L |
| Xylenes (total) | 0.50 | U | ug/L |
| 1,4-Dichlorobutane-SS | | 101 | % rec. |
| Fluorobenzene-SS | | 95 | % rec. |

U = Not detected above the reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by: 

FORM I

kdl.040

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0011

METHOD: 601/602 (MOD)
PURGEABLE HALOCARBONS/AROMATICS

Client Sample ID: VWB10317
Sample Matrix: Water
Dilution Factor: 1.0

Lab Sample ID: VWB10317
Date Extracted: N/A
Date Analyzed: 03/17/96

| Compound | Reporting Limit | Method Blank Result | Units |
|---------------------------|--------------------|---------------------------|--------|
| 1,1-Dichloroethane | 0.50 | U | ug/L |
| trans-1,2-Dichloroethene | 0.50 | U | ug/L |
| 1,2-Dichloroethane | 0.50 | U | ug/L |
| 1,1,1-Trichloroethane | 0.50 | U | ug/L |
| Trichloroethene | 0.50 | U | ug/L |
| 1,1,2,2-Tetrachloroethane | 0.50 | U | ug/L |
| Tetrachloroethene | 0.50 | U | ug/L |
| cis-1,2-Dichloroethene | 0.50 | U | ug/L |
| Benzene | 0.50 | U | ug/L |
| Toluene | 0.50 | U | ug/L |
| Xylenes (total) | 0.50 | U | ug/L |
| 1,4-Dichlorobutane-SS | | 98 | % rec. |
| Fluorobenzene-SS | | 96 | % rec. |

U = Not detected above the reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by: 

FORM I

kdl.040

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0012

METHOD: 601/602 (MOD)
PURGEABLE HALOCARBONS/AROMATICS

Client Sample ID: VWB10318
Sample Matrix: Water
Dilution Factor: 1.0

Lab Sample ID: VWB10318
Date Extracted: N/A
Date Analyzed: 03/18/96

| Compound | Reporting Limit | Method Blank Result | Units |
|---------------------------|--------------------|---------------------------|--------|
| 1,1-Dichloroethane | 0.50 | U | ug/L |
| trans-1,2-Dichloroethene | 0.50 | U | ug/L |
| 1,2-Dichloroethane | 0.50 | U | ug/L |
| 1,1,1-Trichloroethane | 0.50 | U | ug/L |
| Trichloroethene | 0.50 | U | ug/L |
| 1,1,2,2-Tetrachloroethane | 0.50 | U | ug/L |
| Tetrachloroethene | 0.50 | U | ug/L |
| cis-1,2-Dichloroethene | 0.50 | U | ug/L |
| Benzene | 0.50 | U | ug/L |
| Toluene | 0.50 | U | ug/L |
| Xylenes (total) | 0.50 | U | ug/L |
| 1,4-Dichlorobutane-SS | | 99 | % rec. |
| Fluorobenzene-SS | | 94 | % rec. |

U = Not detected above the reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by: 

FORM I

kdl.040

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0013

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RESULTS

Lab Sample ID: RB160800MS/RB160800MSD
Client ID: MATRIX SPIKE/MS DUPLICATE
Date Analyzed: 03/17/96

Analysis: 601/602 (MOD)
Matrix: WATER

| Compound | Concentration Spiked (ug/L) | Sample Result (ug/L) | Spike Result (ug/L) | Spike Percent Recovery |
|---------------------------|-----------------------------|----------------------|---------------------|------------------------|
| 1,1-Dichloroethane | 20 | < 0.50 | 21 | 105 |
| trans-1,2-Dichloroethane | 20 | < 0.50 | 19 | 95 |
| 1,2-Dichloroethane | 20 | < 0.50 | 19 | 95 |
| 1,1,1-Trichloroethane | 20 | < 0.50 | 19 | 95 |
| Trichloroethane | 20 | < 0.50 | 23 | 115 |
| 1,1,2,2-Tetrachloroethane | 20 | < 0.50 | 22 | 110 |
| Tetrachloroethane | 20 | < 0.50 | 20 | 100 |
| cis-1,2-Dichloroethane | 20 | < 0.50 | 20 | 100 |
| Benzene | 20 | < 0.50 | 19 | 95 |
| Toluene | 20 | < 0.50 | 18 | 90 |
| Xylenes (total) | 60 | < 0.50 | 56 | 93 |

| Compound | Concentration Spiked (ug/L) | Sample Result (ug/L) | Duplicate Spike Result (ug/L) | Spike Percent Recovery | RPD |
|---------------------------|-----------------------------|----------------------|-------------------------------|------------------------|-----|
| 1,1-Dichloroethane | 20 | < 0.50 | 21 | 105 | 0.0 |
| trans-1,2-Dichloroethane | 20 | < 0.50 | 20 | 100 | 5.1 |
| 1,2-Dichloroethane | 20 | < 0.50 | 20 | 100 | 5.1 |
| 1,1,1-Trichloroethane | 20 | < 0.50 | 20 | 100 | 5.1 |
| Trichloroethane | 20 | < 0.50 | 25 | 125 | 8.3 |
| 1,1,2,2-Tetrachloroethane | 20 | < 0.50 | 23 | 115 | 4.4 |
| Tetrachloroethane | 20 | < 0.50 | 20 | 100 | 0.0 |
| cis-1,2-Dichloroethane | 20 | < 0.50 | 20 | 100 | 0.0 |
| Benzene | 20 | < 0.50 | 19 | 95 | 0.0 |
| Toluene | 20 | < 0.50 | 19 | 95 | 5.4 |
| Xylenes (total) | 60 | < 0.50 | 57 | 95 | 1.8 |

Accuracy:

$$\text{Percent Recovery} = \frac{\text{Spike Result} - \text{Sample Result}}{\text{Concentration Spiked}} \times 100$$

Precision:

$$\text{RPD} = \frac{\text{Spike \% Rec.} - \text{Duplicate Spike \% Rec.}}{\text{Spike \% Rec.} + \text{Duplicate Spike \% Rec.}} \times 200$$

Comments:

Approved by: _____

kdl.040

FORM III

Quality Analytical
Laboratories, Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

0014

CHAIN OF CUSTODY DOCUMENTATION

Barr

Chain of Custody A

Engineering Company

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number

23, 27, - 169 PZS 002

No 20623

Number of Containers/Preservative

Project Manager:

CMM

Project Contact:

MSH

Laboratory:

QAL REDDING

Remarks/
Analysis Required:

| Sample Identification | Collection | | Matrix | | | Type | | QC | Volatile Organic (Unpres.) | Volatile Organic (Pres.) | Semivolatile Organic | Total Metals (HNO ₃) | Dissolved Metals (HNO ₃) | General (Unpreserved) | Cyanide (N ₂ OH, Asc. Acid) | Nutrients (H ₂ SO ₄) | Oil and Grease (H ₂ SO ₄) | TOC (H ₂ SO ₄) | Sulfide (Zn Acetate) | Dioxin | Whirlpak/Bacteria | Total Phenol (H ₂ SO ₄) | Total No. Of Containers | Remarks/ Analysis Required: |
|-----------------------|------------|------|--------|------|-------|------|-------|----|----------------------------|--------------------------|----------------------|----------------------------------|--------------------------------------|-----------------------|--|---|--|---------------------------------------|----------------------|--------|-------------------|--|-------------------------|--------------------------------|
| | Date | Time | Water | Soil | Other | Grab | Comp. | | | | | | | | | | | | | | | | | |
| 1. INF | 3-11-96 | 1200 | ✓ | | | ✓ | | | W | | | | | | | | | | | | | | 3 | TCE |
| 2. EFF | | 1400 | ✓ | | | ✓ | | | W | | | | | | | | | | | | | | 3 | |
| 3. MG-EFF | | 1215 | ✓ | | | ✓ | | | W | | | | | | | | | | | | | | 3 | |
| 4. DSCHG | | 1230 | ✓ | | | ✓ | | | W | | | | | | | | | | | | | | 3 | |
| 5. M-1 | | | ✓ | | | ✓ | | | W | | | | | | | | | | | | | | 3 | |
| 6. TB-1 | | | ✓ | | | | ✓ | | W | | | | | | | | | | | | | | 3 | |
| 7. | | | | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | | | | |
| 11. | | | | | | | | | | | | | | | | | | | | | | | | |
| 12. | | | | | | | | | | | | | | | | | | | | | | | | |
| 13. | | | | | | | | | | | | | | | | | | | | | | | | |
| 14. | | | | | | | | | | | | | | | | | | | | | | | | |
| 15. | | | | | | | | | | | | | | | | | | | | | | | | |
| 16. | | | | | | | | | | | | | | | | | | | | | | | | |

Sampled By:

Kim Johansson

Relinquished By:

Kim Johansson

Date
3-11-96

Time

Time

Received by Lab:

Weather & Co.

Date
3/12/96Time
0910

Remarks:

Samples Shipped VIA ☐ Air Freight ☒ Fed. Exp. ☐ Sampler ☐ Other

Air Bill Number:

5898334654

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator